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Minerals Yearbook

1982

Volume III

AREA REPORTS: INTERNATIONAL

Prepared by staff of the

BUREAU OF MINES

UNITED STATES DEPARTMENT OF THE INTERIOR • William P. Clark, Secretary

BUREAU OF MINES • Robert C. Horton, Director

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, and park and recreation areas, and for the wise use of all those resources. The Department also has a major responsibility for American Indian reservation communities and for the people who live in Island Territories under U.S. administration.

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Foreword

With the 1982 Minerals Yearbook, the Federal Government begins its second century of annual reports on the mineral industries. This edition discusses the performance of the worldwide mineral industry during 1982 and provides background information to assist in interpreting developments during the year being reviewed. Content of the individual volumes follows:

Volume I, Metals and Minerals, contains chapters on virtually all metallic and nonmetallic mineral commodities important to the U.S. economy. In addition, it includes a statistical summary chapter and a chapter on mining and quarrying trends.

Volume II, Area Reports: Domestic, contains chapters on the mineral industry of each of the 50 States, the U.S. island possessions in the Pacific Ocean and the Caribbean Sea, and the Commonwealth of Puerto Rico. This volume also has a statistical summary.

Volume III, Area Reports: International, contains the latest available mineral data on more than 130 foreign countries and discusses the importance of minerals to the economies of these nations. A separate chapter reviews the international mineral industry in general and its relationship to the world economy.

The Bureau of Mines continually strives to improve the value of its publications to its users. Therefore, constructive comments and suggestions by readers of the Yearbook will be welcomed.

Robert C. Horton, *Director*

Acknowledgments

The Bureau of Mines, in preparing volume III, utilized extensively statistics and data on mineral production, consumption, and trade provided by various foreign government mineral and statistical agencies through various official publications. The cooperation and assistance of these organizations is gratefully acknowledged. Statistical and informational material was also obtained from reports of the U.S. Department of State, from United Nations publications, and from the domestic and foreign technical and trade press. Of particular assistance were the routine and special reports submitted by the minerals, petroleum, economic, and commercial officers and other members of the Department of State. Their contributions are sincerely appreciated.

The text and tables of this volume were prepared by the staff of the Division of Foreign Data, Assistant Directorate, Minerals Information. Final correlation and checking of this volume was performed by the Division of Publication.

The regimes of some countries reviewed in this volume are not recognized by the U.S. Government. The information contained herein is technical and statistical in nature and is not construed as conflicting with or being contradictory of U.S. policies toward these countries.

Albert E. Schreck, *Chief, Division of Publication*

Contents

Minerals in the World Economy

By Charles L. Kimbell[1] and John Panulas[2]

Virtually every available measure of total world mineral industry activity demonstrated that 1982 was little, if any, better for the industry than 1981 had been. Levels of production, trade, and consumption for virtually every major commodity declined; unit prices for most commodities fell, particularly in terms of constant dollars, and as a result of cutbacks in output and lower prices, capital available for investment within the industry was reduced. These conditions, coupled with the existence of considerable idle capacity, tended to retard investment, although there was an upturn in U.S. oil industry investment overseas.

Despite the overall depressed situation of the world's mineral industry, there were indications of possible improvements in market economy countries near yearend, as output of some materials increased marginally and as prices for some mineral commodities reversed their downward trends. The downturns in total world mineral industry activity were not universal from the viewpoint of individual countries. Indeed, output of a number of commodities increased in centrally planned economy countries, and these gains were insufficient to offset declines in market economy countries, thereby sharply altering the proportion of total world output accounted for by each of these two groups of countries. There was a similar shift in consumption on a percentage basis.

International political events continued to have effects on mineral output and trade, but the influences were not so much upon worldwide levels of activity but rather upon the geographic distribution of these activities. In the Near East, the continuing war between Iran and Iraq served to curtail mineral industry activities in those nations, but there were clear signs that Iran was beginning to increase production from the much reduced levels of 1981 despite continuing hostilities.

Persistent intranational and international political problems in the Eastern Mediterranean countries of Lebanon, Syria, and Israel in 1982 undoubtedly restricted mineral activities below the levels that could have been attained were there peace in the area, but the relatively small contribution that these nations make to total world mineral supplies made the problems of this distressed area minimal to worldwide mineral industry activity.

The continued Soviet presence in Afghanistan undoubtedly had an adverse effect on mineral industry development there, but as in the Eastern Mediterranean, the impact on world mineral supplies was negligible, and the same could be said for continued internal and international strife in the Central American countries of Nicaragua, Costa Rica, Honduras, and Guatemala.

There were some allegations that the British-Argentinian confrontation over the Falkland Islands might be based in part on unproven offshore oil potential of those isolated islands, but it was apparent that far more important were the domestic and international implications to both countries of the basic principles of sovereignty. The main significance of this war to the mineral industry was in the vastly increased fuel consumption for the naval and air arms of the belligerents. If an offshore oil potential exists at all, and its existence seems purely speculative, construction of production facilities in the storm-tossed waters near the Falklands would be even more hazardous and costly than present ventures in the North Sea.

Poland's mineral industry undoubtedly suffered adversely from continued worker dissatisfaction and governmental actions, but partial recovery was evident in some industries.

Interest in a Law of the Sea Treaty in general and in seabed mining in particular remained more a subject for academic consideration through the year.

PRODUCTION

The estimated value of world crude mineral production in 1982 was $540,000 million in terms of 1978 dollars, an amount slightly below the 1981 value and 4.8% below the historical peak of 1979, as shown in the following tabulation on value of world mineral production for selected years:

Year	Billion constant 1978 dollars	
	Value of 53[1] major crude mineral commodities[2]	Value of all crude mineral commodities[3]
1950	67.8	77.2
1953	88.5	101.7
1958	113.6	136.5
1963	125.7	154.0
1968	145.6	176.5
1973	234.0	281.6
1978	478.9	539.7
1979[r]	503.1	567.0
1980[r]	489.5	551.7
1981[r]	482.3	543.6
1982	480.0	540.0

[r]Revised.

[1]The list of commodities included appears in table 3 of this chapter; one commodity covered in 1950-68 (beryl) is excluded from the 1973-81 figures, but the overall impact of this omission is regarded as insignificant.

[2]Data for all years except 1979, 1980, 1981, and 1982 are as reported in Annales des Mines, November-December 1980, p. 173; data for 1979, 1980, and 1981 are extrapolated from the 1978 Annales des Mines figures on the basis of the United Nations index of extractive industry production in the United Nations Monthly Bulletin of Statistics, May 1983, p. xiv, and that for 1982 are estimated from available quarterly data and a variety of other sources of information.

[3]Data extrapolated from values of 53 commodities to compensate for other mineral products. For details on the basis for this extrapolation, see accompanying text under "Value of World Mineral Production."

The estimate of the total world crude mineral output value for 1982 cannot be supported by available United Nations data; these data being incomplete. On the basis of published indices for total world mineral production through the first three-quarters of the year, the value of output would slightly exceed that of 1981, but it is felt that direct extrapolation using such partial data would provide an erroneous result.

The foregoing data on value of crude mineral output do not completely portray the role of the mineral industry in the world economy in that they represent only the value of crude mine output (raw material from mines, quarries, and wells) rather than the considerably enhanced value that results from beneficiation, smelting, refining, and other equivalent downstream processing. If the value added through such processing were included, a 1982 figure of $1,270,000 million (1978 dollars) could be regarded as a conservative estimate of the value of output of mineral industry plants operating from primary materials only. An additional unestimated increment should also be included for the value of those processed materials recovered from secondary sources—scrap and other reclaimed materials.

It should be stressed that crude and processed mineral commodities constitute not only the overwhelmingly dominant share of the total raw material base for all manufacturing operations but also, in the form of fertilizers, are a vital material for the agricultural sector, and the only significant source of energy for all sectors of the world's economy.

PRODUCTION INDEX PATTERNS

The following tabulation summarizes the development pattern in world mineral industry output as reflected by the United Nations indexes for extractive mineral industry components:

Year	Index numbers (1975=100)			
	Coal	Crude petroleum and natural gas	Metals	Extractive industry total
Annual averages:				
1978	100.9	116.4	100.9	112.7
1979	106.1	122.4	103.2	118.4
1980	109.2	117.1	105.1	115.2
1981	108.3	115.0	103.0	113.5
1982[1]	110.2	120.4	100.4	117.3
Quarterly results:				
1981:				
1st quarter	112.8	116.0	102.1	114.8
2d quarter	99.9	122.7	104.4	118.5
3d quarter	108.4	116.3	101.8	114.2
4th quarter	112.2	105.1	103.5	107.0
1982:				
1st quarter	112.6	108.0	102.3	109.2
2d quarter	112.7	127.0	102.5	122.7
3d quarter	105.4	126.1	96.4	120.0
4th quarter	NA	NA	NA	NA

NA Not available.
[1]Average for 1st through 3d quarters, inclusive only, and as such, probably not reflective of full-year activities.

Source: United Nations. Monthly Bulletin of Statistics. V. 37, No. 5, May 1983, p. xiv, except for 1982 annual average, which is calculated from published quarterly data as indicated.

The tabulation demonstrates that while results for the three major components were considerably different from each other through the individual quarters of 1981 and 1982; in aggregate there was a substantial downturn in 1981 and only a modest recovery during the first three-quarters of 1982, with the situation within the fourth quarter still in doubt. Information available on quantitative output of major commodities such as petroleum, coal, and iron ore among others, and upon mineral commodity prices, suggests that fourth-quarter 1982 results will prove to be lower than the average for the first three-quarters of the year, and will reduce the annual indexes to lower levels than those of 1981.

Comparison of world extractive industry production indexes in the foregoing tabulation with indexes for the processing sectors of the mineral industry that are presented in the following tabulation demonstrates that the processing sectors were even more hard hit by the 1981-82 recession than was the extractive sector, with the 1982 averages for the first three-quarters below the yearly averages for 1981 for all three sectors shown.

Year	Index numbers (1975=100)		
	Nonmetallic mineral products	Chemicals, petroleum, coal, and rubber products	Base metals
Annual averages:			
1978	117.4	125.5	115.3
1979	122.0	132.0	120.3
1980	123.1	131.6	117.2
1981	121.6	131.7	116.5
1982[1]	119.1	128.5	110.4
Quarterly results:			
1981:			
1st quarter	117.9	133.8	120.5
2d quarter	127.3	135.4	120.1
3d quarter	122.2	128.6	112.9
4th quarter	119.0	128.9	112.5
1982:			
1st quarter	115.6	130.3	115.1
2d quarter	123.1	129.7	112.8
3d quarter	118.7	125.4	103.3
4th quarter	NA	NA	NA

NA Not available.
[1]Average for 1st through 3d quarters, inclusive only, and as such, probably not reflective of full-year activities.

If fourth-quarter processing results are poorer than those for the first three-quarters, as it is expected that they will be, the overall picture for 1982 will be even poorer than that reflected by the partial figure averages.

Various world areas were far from uniform in their performance, both in mineral extraction and in mineral processing. For region-by-region details, the reader is referred to the source publication for the foregoing tabulations.

QUANTITATIVE COMMODITY OUTPUT

Total world production of 97 distinct mineral commodities and/or specific forms of mineral commodities is given in table 1 for 1978-82. Of these, only 18 registered gains in 1982 relative to the 1981 level, and the remaining 79 recorded declines. These results were far worse than those for 1980-81, when 34 registered gains and 63 recorded declines, and than those for 1979 to 1980, when 55 registered gains and 42 recorded declines. It is significant to note that of the 79 commodities with lower 1982 output than that of 1981, 53 had recorded declines between 1980 and 1981 as well, while of the 18 commodities showing increases in 1982 relative to their 1981 output level, only 9 recorded increases between 1980 and 1981 as well.

Of the 50 listed metallic commodities, only 9 were produced in greater quantities in 1982 than in 1981. The only major commodities recording increases were gold, silver, lead, and zinc, all at the mine stage of production only, and primary smelter and refined lead.

Among the 36 nonmetallic commodities listed, only 6 showed increases between 1981 and 1982, and of these 6, cement and gem and industrial diamond were the only major commodities registering increases. Cement would have declined were it not for a phenomenal 12% growth in the recorded output of China; most major producers reduced output in 1981.

Of the 11 fuel mineral commodities (excluding uranium, which is included under metals), 8 recorded declines in output levels between 1981 and 1982. The continued decline in oil and gains for natural gas and coal were notable.

No viable means exist to sum up the overall performance of the nonfuel mineral industry except on a value basis, and for these commodities, exactitudes on value on a commodity-by-commodity basis are not available for 1979-82. Among the fuel commodities, however, the overall pattern of output change can be demonstrated by United Nations data in which all fuels are reduced to a common energy equivalent basis. The following tabulation summarizes world energy commodity output for 1977-81 on this basis, with estimates for 1982:

Year	Million metric tons of standard coal equivalent[1]				
	Coal	Crude petroleum and natural gas liquids	Natural gas	Hydro and nuclear electricity	Total
1977	2,447	4,482	1,681	249	8,859
1978[r]	2,450	4,524	1,765	275	9,014
1979	[r]2,583	[r]4,718	[r]1,855	288	[r 2]9,445
1980[r]	2,621	4,495	1,874	302	9,292
1981	2,641	4,231	1,903	320	9,095
1982[e]	2,730	4,035	1,880	310	8,955

[e]Estimated. [r]Revised.

[1]Virtually all figures are revised from those published in the 1980 edition of this chapter owing to revisions made by the source agency.

[2]Data do not add to total shown because of independent rounding.

Sources: United Nations. 1980 Yearbook of World Energy Statistics. New York, 1982, p. 2; 1981 Yearbook of World Energy Statistics. New York, 1983, p. 2.

Table 1.—World production of major mineral commodities[1]

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite, gross weight[2] thousand metric tons	82,555	86,991	90,699	87,054	76,333
Alumina, gross weight do	29,753	31,374	33,426	31,969	27,829
Unalloyed ingot metal do	14,131	14,574	15,381	15,072	13,268
Antimony, mine output, metal content metric tons	61,907	63,067	63,476	57,476	53,800
Arsenic, white[3 4] do	30,818	29,631	28,596	28,043	26,730
Beryl concentrate, gross weight[3 4] do	2,620	2,397	2,561	2,955	2,865
Bismuth[3] do	4,254	3,423	3,323	3,382	3,248

See footnotes at end of table.

Table 1.—World production of major mineral commodities[1] —Continued

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Cadmium metal, smelter ____ metric tons	17,310	18,654	17,953	17,242	16,140
Chromite, gross weight[4] thousand metric tons	9,255	9,588	9,766	9,057	8,185
Cobalt:					
Mine output, metal content ____ metric tons	26,824	29,832	30,974	32,275	25,084
Metal, refined ____ do	24,750	28,301	29,844	25,616	19,691
Columbium-tantalum concentrate[4 5] ____ do	23,633	35,156	36,615	35,568	34,344
Copper:					
Mine output, metal content thousand metric tons	7,604	7,675	7,663	8,175	7,963
Metal:					
Smelter:					
Primary[6] ____ do	7,533	7,526	7,453	7,826	7,718
Secondary[7] ____ do	413	476	462	471	434
Refined:					
Primary[6] ____ do	7,567	7,591	7,580	7,981	7,837
Secondary[7] ____ do	1,252	1,344	1,388	1,338	1,282
Gold, mine output, metal content thousand troy ounces	39,057	38,807	39,197	41,225	42,713
Iron and steel:					
Iron ore, gross weight thousand metric tons	846,648	912,057	897,854	856,737	795,200
Metal:					
Pig iron ____ do	505,699	531,274	515,644	505,604	453,616
Ferroalloys ____ do	13,840	16,009	15,568	14,701	13,709
Steel, crude ____ do	714,811	744,872	714,007	705,208	641,012
Lead:					
Mine output, metal content ____ do	3,372	3,406	3,411	3,356	3,464
Metal:					
Smelter:					
Primary[6] ____ do	3,162	3,228	3,144	3,082	3,230
Secondary ____ do	1,961	2,083	1,935	1,946	1,845
Refined:					
Primary ____ do	3,278	3,331	3,323	3,178	3,236
Secondary ____ do	2,236	2,385	2,223	2,142	1,996
Magnesium metal, smelter, primary[8] metric tons	288,263	307,428	316,112	295,660	247,361
Manganese ore, gross weight thousand metric tons	22,642	26,274	26,364	23,543	22,436
Mercury, mine output, metal content 76-pound flasks	181,372	174,436	205,210	213,970	204,009
Molybdenum, mine output, metal content metric tons	100,064	104,031	109,617	109,360	90,872
Monazite concentrate (source of rare-earth metals and thorium) ____ do	22,380	22,371	20,619	19,735	19,760
Nickel:					
Mine output, metal content thousand metric tons	658	681	759	712	608
Metal, smelter ____ do	603	643	730	698	619
Platinum-group metals, mine output thousand troy ounces	6,440	6,487	6,838	6,923	6,454
Selenium metal, smelter[4 5] ____ metric tons	1,443	1,620	1,270	1,302	1,218
Silver, mine output, metal content thousand troy ounces	344,978	343,848	339,382	362,308	372,528
Tellurium metal, smelter[4 5] ____ metric tons	152	147	110	105	97
Tin:					
Mine output, metal content ____ do	241,108	245,307	247,264	252,575	241,114
Metal, smelter ____ do	244,128	249,242	249,916	247,250	241,164
Titanium concentrate, gross weight:					
Ilmenite[4 9] ____ thousand metric tons	3,515	3,515	3,643	3,638	3,058
Rutile[3 4] ____ do	302	357	417	371	346
Titaniferous slag ____ do	941	764	1,219	1,129	1,061
Tungsten, mine output, metal content metric tons	46,056	48,506	51,210	49,206	44,872
Uranium oxide, mine output, U_3O_8 content[4 5] do	44,101	45,037	51,993	52,059	48,255
Vanadium, mine output, metal content ____ do	32,129	35,968	36,751	37,433	34,982
Zinc:					
Mine output, metal content thousand metric tons	5,854	5,872	5,757	5,657	6,047
Metal, smelter:					
Primary[6] ____ do	5,674	6,027	5,808	5,827	5,586
Secondary[7] ____ do	208	243	248	285	295
Zirconium concentrate[3] ____ do	525	628	678	632	555
NONMETALS					
Asbestos ____ do	4,693	4,906	4,808	4,480	4,311
Barite ____ do	6,886	7,257	7,428	8,216	7,155
Boron minerals ____ do	2,663	2,520	2,609	2,558	2,269
Bromine[4] ____ do	361	403	342	342	380
Cement, hydraulic ____ do	852,946	872,085	884,324	891,990	892,108
Clays:[4]					
Bentonite[5] ____ do	6,114	6,339	6,363	6,780	5,186
Fuller's earth[5] ____ do	1,731	1,833	1,767	1,926	1,996

See footnotes at end of table.

Table 1.—World production of major mineral commodities[1] —Continued

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Clays[4] —Continued					
Kaolin thousand metric tons	19,417	21,062	20,834	20,589	19,088
Corundum, natural metric tons	17,217	26,366	29,081	22,133	19,117
Diamond:[4]					
Gem[e] thousand carats	9,461	10,235	10,626	10,451	10,564
Industrial[e] do	30,162	29,195	33,251	32,106	34,602
Total do	39,623	39,430	43,877	42,557	45,166
Diatomite[4] thousand metric tons	1,460	1,520	1,513	1,475	1,390
Feldspar[4] do	3,035	3,111	3,133	3,142	3,099
Fluorspar do	4,665	4,612	4,821	5,051	4,539
Graphite[3] metric tons	533,798	625,524	609,679	574,121	550,418
Gypsum thousand metric tons	77,799	80,319	77,351	76,272	73,134
Iodine metric tons	10,378	11,134	11,580	12,027	11,773
Lime[4] thousand metric tons	121,210	120,022	121,034	116,507	112,114
Magnesite[3] do	10,232	10,987	11,630	11,209	11,129
Mica[4] do	352	333	316	335	283
Nitrogen: N content of ammonia do	67,223	71,244	73,949	74,002	72,549
Perlite do	1,428	1,506	1,477	1,426	1,344
Phosphate, gross weight:					
Phosphate rock do	125,022	132,010	139,604	137,524	122,633
Thomas slag do	4,498	4,593	4,349	3,429	3,335
Guano do	27	10	29	8	9
Potash, marketable, K_2O equivalent do	26,122	25,768	27,855	27,046	26,730
Pumice[4 5] do	14,665	13,865	13,102	12,459	11,676
Salt do	168,248	173,429	168,397	170,352	168,696
Sodium compounds, n.e.s.:[4]					
Sodium carbonate do	27,210	28,053	28,276	28,027	27,734
Sodium sulfate do	5,237	5,537	5,406	5,489	5,247
Strontium minerals[4 5] metric tons	92,871	97,500	94,432	118,856	110,820
Sulfur, elemental basis:					
Elemental[10] thousand metric tons	16,242	16,654	17,235	16,239	13,932
From pyrite do	9,694	9,803	10,388	10,439	10,431
Byproduct[11] do	26,202	26,728	27,386	26,885	26,297
Total do	52,138	53,185	55,009	53,563	50,660
Talc, soapstone, pyrophyllite do	6,397	6,876	7,529	7,217	6,883
Vermiculite[4 5] metric tons	542,146	540,179	537,723	522,669	511,966
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[4 5] thousand metric tons	3,991	4,134	4,192	4,163	3,964
Coal:					
Anthracite million metric tons	228	228	226	228	225
Bituminous do	2,411	2,561	2,617	2,620	2,718
Lignite do	925	953	962	992	1,023
Total do	3,564	3,742	3,805	3,840	3,966
Coke:[12]					
Metallurgical thousand metric tons	355,231	370,162	366,265	360,534	351,192
Other do	12,904	12,566	12,529	11,089	11,066
Gas, natural, marketed billion cubic feet	51,357	54,360	54,840	55,491	54,783
Natural gas liquids[4] million 42-gallon barrels	1,090	1,175	1,196	1,307	1,269
Peat thousand metric tons	236,320	269,953	305,804	351,286	370,304
Petroleum:					
Crude million 42-gallon barrels	22,090	22,907	21,900	20,664	19,224
Refined do	22,836	23,340	22,629	21,633	20,852

[e]Estimated. [p]Preliminary.

[1]Incorporates numerous revisions from the table corresponding to this table in previous editions of this chapter. Figures generally conform to those published in appropriate commodity chapters of volume I of the Minerals Yearbook, 1982 edition.

[2]Includes bauxite equivalent of nepheline syenite and alunite produced in the U.S.S.R. (the only producer on record of such materials as a source of aluminum).

[3]Excludes data for the United States (withheld to avoid disclosing company proprietary data).

[4]Excludes data for China (no adequate basis for estimation available).

[5]Excludes data for the U.S.S.R. (no adequate basis for estimation available).

[6]Includes all metal clearly identified as primary as well as all metal that cannot be subdivided clearly between primary and secondary (see footnote 7).

[7]Includes only that metal that is clearly identified as secondary. Some countries do not distinguish between primary and secondary, and for some of these, no basis is available for estimating the breakdown of total production. For such countries, the total has been included under primary (see footnote 6).

[8]Excludes data for the United States (withheld to avoid disclosing company proprietary data), which in previous years accounted for approximately 50% of the world total.

[9]Includes leucoxene.

[10]Comprises sulfur produced by the Frasch process plus sulfur mined in the elemental state from ores.

[11]Comprises sulfur recovered from coal gasification, metallurgical operations (except pyrite processing), natural gas, petroleum, tar sands, spent oxides, and gypsum, whether recovered in the elemental state or as a sulfur compound.

[12]Production of coke other than metallurgical by China and the U.S.S.R. is included with metallurgical coke production.

VALUE OF WORLD MINERAL PRODUCTION

The value of world crude mineral output in 1982 was estimated at $540.0 billion constant 1978 dollars as shown in a foregoing tabulation. Details on the methodology employed to prepare this estimate are summarized in the 1980 edition of this chapter, to which the reader is referred.

GEOGRAPHIC DISTRIBUTION OF WORLD MINERAL OUTPUT VALUE

Available information is inadequate to extrapolate to 1982 the 1978 data on geographic distribution of world crude mineral output published in the November-December 1980 edition of Annales des Mines. A summary of the 1978 distribution, together with comparable figures for 1973 and 1950 and additional textual comments on regional distribution of these values, was included in the 1980 edition of this chapter, and the reader is referred to this publication as well as to the original source for further detail.

COMMODITY DISTRIBUTION OF WORLD MINERAL OUTPUT VALUE

As in the case of geographic distribution of world crude mineral output value, the inadequacy of data precludes any reliable extrapolation of the various commodities' shares of the totals shown in the preceding edition of this chapter and in the source publication, Annales des Mines. The reader should refer to these publications for the data for 1978 and prior years.

TRADE

In 1981, the aggregate value of total world trade in mineral commodities totaled an estimated $765,600 million (current dollars), a 3.7% decline from the record high set in 1980 and the first decline registered in a number of years. Comparable data for 1982 were not available in time for inclusion in this chapter, but available partial information suggests a further slight decline, based on lower volumes of material moved and lower unit prices for a number of commodities. This decline would be even more significant if the computations were on the basis of constant rather than current dollars. The following tabulation summarizes the growth pattern in mineral commodity trade value for 1977-81 inclusive, as well as the share of that trade in total commodity trade:

Year	Estimated value of all mineral commodities traded (millions)	Change from previous year (percent)	Mineral commodities' share of all commodities traded (percent)
1977	$387,400	+9.7	34.4
1978	r407,500	r+5.2	31.4
1979r	581,200	+42.6	35.5
1980r	795,200	+36.8	39.9
1981	765,600	-3.7	39.1

rRevised.

Table 2, which serves as the basis for the estimates of total mineral commodity trade that appear in the foregoing tabulation, provides reported data on the value of trade in major mineral commodity groups and total commodity trade for 1977-81. Table 3 shows the percentage share of major mineral commodity groups in the aggregate for these commodities for 1977-81, and table 4 provides individual growth (or, particularly in the case of 1981, decline) rates for each of the major mineral commodity groups as well as for total commodity trade for the same 5 years. Major mineral commodity trade by region (such as tables 8-10 in the 1976 edition of this chapter provide) may be obtained for more recent years directly from the United Nations Monthly Bulletin of Statistics for May 1983.

CONSUMPTION

NONFUEL MINERAL COMMODITIES

From the viewpoint of total world consumption of mineral commodities, 1982 registered declines in virtually every commodity for which data are available. Table 5 provides statistics on iron ore, iron and steel scrap, aluminum, cadmium, copper, lead, magnesium, nickel, tin, zinc, nitrogenous fertilizers, phosphatic fertilizers, potassic fertilizers, and sulfur, and of these 14 commodities, only nitrogenous fertilizers recorded a slight increase in consumption. (Cadmium registered no decline in the table, because both years are recorded as 16,000 tons, but there was a small drop in consumption). Even for copper, phosphatic fertilizers, and potassic fertilizers, which went against the trend in 1981, registering modest consumption gains, the year 1982 was one of diminished demand.

For the two steel industry raw materials listed, the declines in consumption in 1982 were even more pronounced than those in 1981; in contrast, among nonferrous metals, all except cadmium, copper, and zinc recorded greater declines in 1981 than in 1982, reflecting possibly a somewhat stronger fourth-quarter result.

Data on nonferrous metals in table 5 is presented for the first time in this chapter distributed between market economy countries and centrally planned economy countries. This has been done not only to demonstrate the varying pattern in consumption level changes between these two distinct groups of countries, but also because the figures for the centrally planned economy countries as prepared for the source publications incorporate production figures for the U.S.S.R. that for some commodities are at considerable variance with U.S. Bureau of Mines estimates. Utilization of such figures in calculations to estimate consumption levels obviously produce results different from those that would result if Bureau of Mines figures were used. The average differences in centrally planned economy consumption that would result if Bureau of Mines production data were substituted would be as follows: aluminum—lower by 600,000 tons per year; copper—lower by 440,000 tons per year; lead—lower by 150,000 tons per year; nickel—higher by 11,000 tons per year; tin—higher by 19,000 tons per year; and zinc—lower by 200,000 tons per year. There would be no significant change in cadmium or magnesium.

Among the fertilizer nonmetals listed, the particularly poor 1982 showing demonstrated in table 5 is more a function of the years used rather than an actual vast downturn: data listed for 1981 in reality are for the last half of 1980 and the first half of 1981, and thus do not reflect the worsening of conditions in late 1981. The 1982 figures then represent the last half of 1981 and the first half of 1982, and as such do not reflect any recovery that may have begun during those months from July through December 1982. Sulfur's poor showing, on a calendar year basis, is attributed to continued economic problems within some major sulfur-consuming industries in market economy countries.

MINERAL FUEL COMMODITIES

Table 5 also includes data on mineral fuel commodity consumption, with use of each fuel expressed in terms of standard coal equivalent in order to make interfuel comparisons possible. It should be further noted that departing from practice in past issues of this chapter, estimates have been provided for the year of review, 1982 in this case. Previous editions provided information only for the year prior to the year of review. The table demonstrates the continued downturn in liquid fuel use, both quantitatively and on the basis of its share of the total, as well as a slight downturn for natural gas both quantitatively and proportionally, for the first time in several years. Solid fuels and primary electricity registered gains, but these were insufficient to offset the liquid and gaseous fuel losses.

INVESTMENT

Comprehensive world mineral industry investment data do not exist, but available figures generally point to a slightly reduced rate of investment. Data published by the U.S. Department of Commerce germane to U.S. foreign investment in 1982 showed a sharp decline in capital outlays, relative to those of 1981.

Available information on steel industry investment by Organization for Economic Cooperation and Development nations (table 6) shows a modest upturn between 1980 and 1981.

Updated information related to capital expenditures and exploration expenditures for the petroleum industry of market econo-

mies through 1981 are not yet available. For data covering the period 1976-80, the reader is referred to tables 6 and 7 of the 1981 Minerals Yearbook.

Table 7 of this chapter provides some data on U.S. direct foreign investment in mineral industry activities divided between (1) mining, smelting, and refining and (2) petroleum for 1980-82.

TRANSPORTATION

MARINE TRANSPORT

Tankers, bulk carriers, and freighters are the three classes of vessels engaged in transporting mineral commodities. The number, gross tonnage, and deadweight tonnage of these vessels, as well as similar data for other vessels of the world's merchant fleet, as reported by the U.S. Maritime Administration for 1977-78 inclusive, are given in table 8.

It should be noted that vessels in each of the three categories are not devoted wholly to mineral commodity transport. Tankers, although largely engaged in moving crude oil and refinery products, also transport liquid chemicals, wine, molasses, and whale oil. Bulk carriers move agricultural products as well as crude minerals and mineral fertilizers, while freighters, because of their great variety, can be devoted wholly to hauling mineral products or wholly to moving nonmineral goods, as well as carrying mixed mineral and nonmineral cargoes.

Unfortunately, new and revised data on total loadings and unloadings of vessels, divided between tanker-type cargo and dry cargo, such as was presented in table 10 of the previous edition of this chapter for the years 1976-80, was not available in time for inclusion in this edition. Although it is recognized that such figures on loadings and unloadings include goods other than minerals, they nevertheless serve as a reasonable measure of mineral commodity shipments, because the preponderance of total weight of all goods moved is accounted for by minerals. Some measure of the significance of mineral commodity movement to total commodity movement is apparent in data for the world's two major canals, the Panama and the Suez, but it should be noted that figures for these waterways are skewed in favor of nonmineral commodities by both waterways' inability to handle large supertankers and bulk cargo vessels engaged in ore trade. Although exact recent figures are not available, it appears likely that minerals and mineral products account for three-quarters or more of total cargo carried in any single year on a weight basis.

Update information of the geographic breakdown of loadings and unloadings of dry cargo and tanker cargo, respectively, for 1978-80, such as was shown in tables 11-12 of the previous edition of this chapter, also were not available for inclusion in this edition. Again recognizing that both tables include mineral and nonmineral goods, but also recognizing the dominance of mineral materials from the viewpoint of tonnage, the reader is referred to these tables in the 1981 chapter, for some idea of the relative importance of various world areas as origins and destinations for mineral materials.

Although physical characteristics of vessels—size, draft, age, crew requirements, type of propulsion systems, etc.—as well as fuel costs have an undeniable influence on shipping industry performance, problems of the changes in the quantity and type of material being moved also significantly affect the shipping sector of the world economy. Therefore, before detailing changes in composition of the merchant fleet that serves the mineral industry, some observations on major mineral cargoes seem in order.

First in importance because of the volume of material moved was oil. Reflecting a continuing slump that began in 1980, shipments of crude oil and oil products declined 13% from the 1981 level of 1,445 million tons to a level of 1,258 million tons in 1982. Although economic recession and relatively low fuel oil contributed to the reduced demand for seaborne oil transportation, two other factors also exacerbated the problem. The first was the larger shipments of short-haul crude internationally. Of particular significance were the United States purchases of large quantities of Mexican and North Sea crudes in lieu of the higher priced long-haul crudes produced in the Persian Gulf region. The second was the increase in throughput to full capacity at the Ras Tanura-Yanbu (Saudi Arabia) and SUMED (Egypt) pipelines.

Another mineral commodity of considerable importance to seaborne transport was coal, whose shipments fell from 210 million tons in 1981 to 202 million tons (144 million

tons of metallurgical coal and 58 million tons of steam coal) in 1982. In terms of steam coal trade, the United States, Australia, Canada, the Republic of South Africa, and Poland accounted for 86% of exports in 1982. Of this amount, Poland's share was considerable and reflected an increase in its portion of the steam coal market that resulted from cutting steam coal prices to levels below those of the United States and the Republic of South Africa. Consequently, the United States shipped 6 million tons of steam coal less than in 1981, thereby reversing a growth trend in coal exports, and the Republic of South Africa, which has experienced a decline in coal exports in recent years, saw a 2-million-ton reduction in its coal exports. Coal outflows from Australia, Canada, and the U.S.S.R. remained, roughly, at 1981 levels.

On the import side, Japan continued to rank first among the world's coal importers, taking 3.4% more coal in 1982 than in 1981. Responsible for this growth was an increase in the volume of steam coal imported. Australia was Japan's chief coal supplier and was followed by the United States, Canada, and the Republic of South Africa. The other major coal importers were France, Italy, and Canada.

The increasing volume of coal traded over long distances, in 1982, required the use of bulk carriers on the order of 40,000 deadweight tons to an extent that those vessels accounted for 70% of the seaborne coal trade. The remaining 30% were vessels of over 100,000 deadweight tons, used largely in short-haul European movements.

Iron ore ranked first among nonfuel minerals traded, posting total shipments of 272 million tons. However, this amounted to a 31-million-ton decrease from that of 1981, owing primarily to a decline in iron ore demand resulting from reduced steel output. Average haul length, on the other hand, increased from 7,984 ton-kilometers in 1981 to 8,493 ton-kilometers in 1982, a direct effect of more numerous iron ore shipments from Brazil to Japan. Approximately two-thirds of total seaborne iron ore cargoes were transported in bulk carriers of 100,000 deadweight tons, serving the long-haul trades from Australia, South America, and the Republic of South Africa to Europe and Japan. Less than 15% of the total was moved in vessels below 60,000 deadweight tons.

The seaborne bauxite-alumina trades were adversely affected by plant closures in the Federal Republic of Germany, the United States, and Japan by output reductions and by integration of operations, from bauxite mining to aluminum metal production, on the part of developing nations. This was reflected in the 5-million-ton decline in bauxite-alumina shipments, from about 46 million tons in 1981 to roughly 41 million tons in 1982. The preponderance of this total was moved in the short-haul Caribbean-U.S. trades and, consequently, average haul-length remained at its 1981 level of 6,118 ton-kilometers. Approximately 25% was shipped along the long-haul routes from Australia to North America and Europe. Of the total quantity of bauxite-alumina transported, 40% was moved by vessels above 40,000 deadweight tons, 22% by vessels between 40,000 to 60,000 deadweight tons, and 18% by vessels in the 60,000- to 80,000-deadweight-ton category.

Shipments of phosphate rock declined from 41 million tons in 1981 to 39 million tons in 1982. In large measure, reduced phosphate rock exports from the United States and Morocco were the cause of the decrease. Of the cargoes moved, 41% originated from North Africa, of which Morocco's outflows amounted to 36%, 22% from the United States, 16% from the Near East, 8% from the Pacific Islands, and about 7% from West Africa. On the import side, Western Europe took approximately 45% of the total shipped and Eastern Europe took approximately 20%. Of this amount, about 50% was provided by North American producers and about 20% was provided by those of the Near East. Asian imports increased slightly and were chiefly supplied by Jordan. With regard to Latin American imports, it should be noted that Brazil's phosphate rock intake fell from 800,000 tons in 1980 to 400,000 tons in 1982. That precipitous drop impacted most negatively on Morocco, Brazil's principal source of phosphate rock. In terms of haul-length, the average amounted to 5,313 ton-kilometers and the vast majority of vessels employed in the shipment of phosphate rock were of the 40,000-deadweight-ton class.

Bulk Carriers.—In 1981, the world's bulk carrier fleet increased by 189 vessels, compared with an 84-vessel increase in 1980. The 1981 growth represented a 3.9% gain on the basis of number of vessels. There was a very small increase in the average gross tonnage and deadweight tonnage of such

vessels for a second year. The average bulk carriers grossed 22,422 tons and had a deadweight tonnage of 38,975, compared with 1980 figures of 22,286 and 38,622, respectively. The following tabulation shows the distribution of the world's bulk carrier fleet by country of registry for 1981 (it should be noted that the tabulation corresponding to this one in the 1981 edition of this chapter was erroneously captioned as showing 1979 data, when in reality it covered 1980 data):

Country	Number of vessels	Deadweight tonnage (thousand tons)
Liberia	859	42,706
Greece	955	30,843
Japan	504	22,579
Panama	505	14,745
Norway	150	10,472
United Kingdom	198	10,323
Italy	134	6,606
India	105	4,486
Korea, Republic of	134	3,762
Brazil	63	3,719
China	115	3,691
U.S.S.R.	163	3,323
Singapore	77	2,842
France	45	2,645
Germany, Federal Republic of	44	2,537
Spain	71	2,213
Poland	81	2,022
Australia	33	1,650
Belgium	30	1,577
Yugoslavia	51	1,543
Philippines	43	1,447
Romania	44	1,237
Turkey	28	1,004
Netherlands	25	876
Sweden	22	728
Other	508	14,792
Total	4,987	194,368

Freighters.—In 1981, the world's freighter fleet decreased by 41 vessels, a 0.2% decrease. In terms of total gross tonnage and deadweight tonnage, there were 1.9% and 0.2% increases, respectively, over the 1980 levels. The average freighter in 1981 had a gross weight of 6,488 tons (6,367 tons in 1980) and a deadweight tonnage of 8,529 tons (8,514 tons in 1980), a modest increase when the number of vessels involved is considered. The following tabulation shows the distribution of the world's freighter fleet by country of registry for 1981 (the tabulation corresponding to this one in the 1981 edition of this chapter was erroneously captioned as showing 1979 data, when in reality it covered 1980 data):

Country	Number of vessels	Deadweight tonnage (thousand tons)
Panama	1,849	14,669
Greece	1,449	14,550
U.S.S.R.	1,785	11,136
United States	457	6,701
Japan	707	6,631
Liberia	509	5,692
China	529	5,357
United Kingdom	375	4,107
Singapore	400	3,781
Germany, Federal Republic of	314	3,256
India	231	2,862
Netherlands	351	2,470
France	161	1,985
Norway	173	1,976
Yugoslavia	188	1,771
Cyprus	315	1,758
Korea, Republic of	250	1,741
Poland	217	1,722
Denmark	152	1,669
Other	3,789	29,285
Total	14,201	123,119

Tankers.—In 1981, the world's tanker fleet was 158 vessels greater than that of 1980. The average vessel's gross tonnage declined from 34,308 tons in 1980 to 33,451 tons in 1981, and deadweight tonnage similarly declined, from 64,626 tons in 1980 to 62,795 tons in 1981.

The following tabulation distributes the world's tanker fleet by country of registry for 1981 (the tabulation corresponding to this one in the 1981 edition of this chapter was erroneously captioned as showing 1979 data, when in reality it covered 1980 data):

Country	Number of vessels	Deadweight tonnage (thousand tons)
Liberia	845	97,671
Japan	551	33,947
Greece	444	29,094
Norway	257	26,299
United Kingdom	344	22,649
United States	314	16,670
Panama	341	16,231
France	109	13,881
Spain	121	8,790
Italy	229	8,268
U.S.S.R.	452	7,303
Singapore	107	5,293
Denmark	70	5,019
Germany, Federal Republic of	79	4,988
Saudi Arabia	58	4,953
Netherlands	66	4,400
Sweden	72	3,208
Brazil	67	3,201
Other	991	34,574
Total	5,517	346,439

Considering the world's tanker fleet as a whole, there have been some modest changes in the share of the total accounted for by vessels of different size groups over the 5 years, 1978-82, as shown in the following tabulation, based on data published on page 24 in the British Petroleum Co. Ltd. annual publication, BP Statistical Review of the World Oil Industry, 1982:

Size group (deadweight tons)	Percent of total		
	1978	1980	1982
10,000-25,000	4.5	4.3	4.4
25,000-45,000	7.5	7.6	9.0
45,000-65,000	4.9	4.9	5.3
65,000-125,000	15.5	16.2	17.1
125,000-205,000	10.1	10.2	9.9
205,000-285,000	43.4	42.8	39.0
285,000 and over	14.1	14.0	15.3

OCEAN FREIGHT RATES

In 1982, as in 1981, ocean freight rates continued to fall. Tanker rates declined as a result of reduced oil consumption which, in turn, caused cutbacks in oil shipments and a concomitant oversupply of tankers.

Dry cargo rates also fell, the consequence of two factors related directly to the global economic recession. First, steel output dropped considerably and, in turn, demand for iron ore and coal and for the vessels needed to move these commodities also diminished. Second, within this climate of slackened demand for seaborne transportation, the global fleet of bulk and ore carriers expanded by 5.7%. Apparently, deliveries on ships were made on orders that did not anticipate the depressed market conditions of 1982.

PANAMA AND SUEZ CANALS

Summary data on activity at the Panama Canal for the years ending September 30, 1981, and September 30, 1982, are not yet available, and activity for the fiscal year 1980 was summarized in the 1980 edition of this chapter. Readers desiring such information for the more recent years are referred to the annual reports of the Panama Canal Co., when they become available.

At the Suez Canal, a total of 22,545 vessels transited the canal in 1982, an increase of 968 vessels, relative to 1981 transits (up 4.5%). The tonnage passing through the waterway increased from 342,356,000 tons to 363,538,000 tons. Of the total number of vessel transits, tankers accounted for 3,548, a figure 3.2% above that of 1981. The net tonnage credited to tankers dropped from 135,164,000 tons in 1981 to 133,655,000 tons in 1982. The following tabulation indicates the distribution of tankers by number, direction, net tonnage, and status (loaded or in ballast):

Direction	Number		Net tonnage (thousand metric tons)	
	1981	1982	1981	1982
Southbound:				
In ballast	1,168	1,056	89,882	71,148
Laden	806	865	12,254	13,978
Total	1,974	1,921	102,136	85,126
Northbound:				
In ballast	541	465	8,158	8,300
Laden	923	1,162	24,870	40,229
Total	1,464	1,627	33,028	48,529

Freighters ranked next after tankers in terms of number of transits and net tonnage, with bulk carriers following in third rank. The following tabulation summarizes transits by these vessel classes:

Vessel class	Number		Net tonnage (thousand metric tons)	
	1981	1982	1981	1982
Freighters:				
In ballast	1,785	1,860	10,437	11,038
Laden	8,167	8,020	58,808	59,275
Total	9,952	9,880	69,245	70,313
Bulk carriers:				
In ballast	564	772	8,819	12,601
Laden	2,245	2,416	35,520	39,586
Total	2,809	3,188	44,339	52,187

In terms of goods transported in a northbound direction on the Suez, 124,805,008 tons was shipped in 1982, an increase over the 1981 figure of 93,896,000 tons. Of the total, oil and oil products totaled 63,139,000 tons, a 72.7% increase over the 1981 figure of 36,566,000 tons. In 1982, 11,383,000 tons of metals and ores were carried northbound through the Suez, a 9.7% increase over the 1981 level of 10,377,000 tons. Northbound coal shipments transiting the Suez amounted to 3,996,000 tons in 1982, compared with 3,370,000 tons in 1981.

With regard to southbound movement of commodities through the Suez, 106,588,000 tons were carried in 1982, a 4.0% increase over the 1981 figure. Of the total southbound 1982 commodity volume, crude oil and oil products accounted for 20,312,000 tons or 19%. This constitutes an 11.5% increase over the 1981 figure. Southbound metals and ores moved on the Suez decreased from 7,324,000 tons in 1981 to 6,059,000 tons in 1982. Finally, whereas 333,000 tons of southbound coal and coke transited the Suez in 1981, 446,000 tons did so in 1982.

PIPELINES

Limitations of time and space preclude comprehensive assessment of international pipeline activities. Major projects in individual countries are treated in the various country chapters.

PRICES

Comprehensive data on world prices for crude minerals and for mineral products are not available, nor if they were would international averages be very meaningful. Tables 9-11 summarize prices for selected metals in the United States, the United Kingdom, and Canada, respectively, for 1978-82 inclusive, with monthly data provided for 1982. A brief review of the 1982 average prices on each of the three markets reveals that for every commodity shown except for aluminum and cobalt on the U.S. markets, the average price was below the 1981 average, and for these commodities the prices simply remained unchanged. Examining individual monthly prices shown in the tables, there were 10 series that showed an upturn of some sort in the closing months of the year, 6 that registered downturns in the last half of the year, and 4 that remained stable.

It should be noted that the table on U.S. prices includes three additional commodities, cadmium, cobalt, and nickel, and the United Kingdom series includes one additional commodity—gold. This last-named series may be of specific interest, particularly in connection with the following figures, which, on the London market, represent the record final high and low prices for gold for each of the years noted, in U.S. dollars per troy ounce: 1978—high $277, low $173; 1979—high $455, low $277; 1980—high $675, low $514; 1981—high $577, low $409; and 1982—high, $444, low $315. Although gold prices on other markets differed, in some cases significantly from the London prices, these can serve as a general measure of the pattern of fluctuations.

Comparison of crude oil prices between yearend 1981 and yearend 1982 shows that for most Persian Gulf crude oils, prices per barrel f.o.b. declined from a range of US$31.50 to US$35.70 in December 1981 to a range of US$29.30 to US$34.56 in January 1982. African crudes (including Libyan and Algerian) dropped from a range of US$36.32 to US$37.50 to a range of US$34.52 to

US$35.50 in the same period; North Sea crudes declined from US$35.00 (Britian Forties, 36.5° API) to US$33.50 and from US$37.50 (Norway Ekofisk, 42° API) to US$34.25. Indonesian light (35° API) fell by US$0.047 to US$34.53, while Chinese and Venezuelan crude prices went unchanged. Mexican Isthmas crude (34° API) dropped from US$35.00 to US$32.50, and Mexican Maya crude (24° API) declined from US$28.50 to US$25.00. In the United States, the listed price for sweet crude fell from US$35.00 to US$32.25 per barrel, while that for sour crude declined from US$33.00 to US$31.00 per barrel. Only in the case of Canadian crude oil, where the price in Canadian dollars advanced from Can$21.25 to Can$25.75 was an increase reported between 1981 and 1982, and a small part of this increase was a function of the declining value of the Canadian dollar, rather than an increase in the constant dollar price for crude oil.

STATISTICAL SUMMARY OF WORLD PRODUCTION AND TRADE OF MAJOR MINERAL COMMODITIES

The final 24 tables of this chapter, tables 12-35, extend the statistical series on production that was started in the 1963 edition of the International Area Reports volume of the Minerals Yearbook and was subsequently updated and expanded in the 1965 and 1967-81 editions. They are primarily a supplement to other statistical data within this chapter but also serve as a summary of international production data for major mineral commodities covered in greater detail, on a commodity basis, in volume I of the 1982 Minerals Yearbook and on a country basis in volume III.

In this edition, the data presented in these tables, in most instances, correspond with the data in the individual commodity world production tables appearing in volume I and may differ somewhat from a total that might be obtained by adding figures presented for any single commodity in each of the country chapters of volume III. This apparent disparity results from problems of scheduling compilation of tables in the numerous commodity and country chapters in the two volumes. In an effort to provide the user with the most up-to-date information possible, data received after completion of worldwide commodity production tables (volume I) have been included in many of the individual country production tables (volume III). Limitations of time, however, have prevented the incorporation of these revisions in the abbreviated versions of the world commodity tables included here. Thus, a more precise figure for total world production of any commodity could be obtained by adding figures presented in the individual country chapters. For summary purposes, however, it is felt that tables 12-35 of this chapter are sufficiently correct without the inclusion of these generally minor revisions.

The series of data on world trade in major mineral commodities that has appeared in most previous editions of this chapter (tables 57-69 in the 1976 edition) could not be included owing to scheduling problems.

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[1]Senior foreign mineral specialist, Division of Foreign Data.

[2]Foreign mineral specialist, Division of Foreign Data.

Table 2.—Value of world export trade in major mineral commodities[1]

(Million U.S. dollars)

Commodity group	1977	1978[r]	1979[r]	1980[r]	1981
Metals:					
All ores, concentrates, scrap	15,669	16,525	23,559	29,258	26,693
Iron and steel	46,703	57,123	70,399	75,906	72,991
Nonferrous metals	24,235	27,753	37,129	50,332	38,126
Total	86,607	101,401	131,087	155,496	137,810
Nonmetals, crude only	7,009	7,796	9,598	11,891	11,378
Mineral fuels	222,116	222,887	333,031	478,706	474,792
Grand total	315,732	332,084	473,716	646,093	623,980
All commodities	1,124,883	1,298,121	1,636,403	1,994,310	1,960,088

[r]Revised.

[1]Data presented are for selected major commodity groups of the Standard International Trade Classification Revised (SITC-R) and as such exclude some mineral commodities classified in that data array together with other (nonmineral) commodities. SITC-R categories included are as follows: All ores, concentrates, and scrap—SITC Div. 28; iron and steel—SITC Div. 67; nonferrous metals—SITC Div. 68; nonmetals (crude only)—SITC Div. 27; and mineral fuels—SITC Div. 3. Major items not included are the metals, metalloids, and metal oxides of SITC Group 513; mineral tar and other coal-, petroleum-, and gas-derived crude chemicals of SITC Div. 52; manufactured fertilizers of SITC Div. 56; and nonmetallic mineral manufactures of SITC Groups 661, 662, 663, and 667. Data include special category exports, ship stores and bunkers, and other exports of minor importance, and exclude the intertrade of the centrally planned economy countries of Asia and trade between the Federal Republic of Germany and the German Democratic Republic.

Source: United Nations. Monthly Bulletin of Statistics. V. 37, No. 5, May 1983, pp. c-cxxiii.

Table 3.—Distribution of value of world export trade in major mineral commodity groups, by commodity group[1]

(Percent)

Commodity group	1977	1978	1979	1980	1981
Metals:					
All ores, concentrates, scrap	5.0	5.0	5.0	[r]4.5	4.3
Iron and steel	14.8	17.2	14.9	11.7	11.7
Nonferrous metals	7.7	8.4	7.8	8.1	6.1
Total	27.5	30.6	27.7	[r]24.3	22.1
Nonmetals, crude only	2.2	2.3	2.0	1.8	1.8
Mineral fuels	73.3	67.1	70.3	[r]73.9	76.1

[r]Revised.

[1]For detailed definition of groups, see footnote 1, table 2.

Table 4.—Growth of value of world export trade in major mineral commodity groups[1]

(Percent change from that of previous year)

Commodity group	1977	1978[r]	1979[r]	1980[r]	1981
Metals:					
All ores, concentrates, scrap	-0.1	+5.5	+42.6	+24.2	-8.8
Iron and steel	+4.4	+22.3	+23.2	+7.8	-3.8
Nonferrous metals	+12.5	+14.5	+33.8	+40.9	-27.1
All metals	+5.7	+17.1	+29.3	+20.1	-12.5
Nonmetals, crude only	+11.6	+11.2	+23.1	+23.9	-4.3
Mineral fuels	+11.3	+.3	+49.4	+43.7	-.8
All major mineral commodity groups	+9.7	+5.2	+42.6	+36.8	-3.7
All commodities	+13.7	+15.4	+26.1	+21.9	-1.7

[r]Revised.

[1]For detailed definition of groups, see footnote 1, table 2.

Table 5.—World consumption of selected mineral commodities

(Thousand metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
Ferrous metals: World:					
Iron ore, gross weight[e] million metric tons	925	912	883	862	776
Iron and steel scrap, gross weight[e] do	337	344	324	318	286
Nonferrous metals:					
Market economy countries:					
Aluminum, primary, refined	12,027	12,607	12,007	11,238	10,842
Cadmium	13	15	13	13	12
Copper, refined[1]	7,278	7,518	7,118	7,255	6,759
Lead, refined[1]	4,047	4,118	3,842	3,764	3,715
Magnesium, primary	206	213	207	184	166
Nickel[2]	512	586	528	469	434
Tin, refined[1]	177	179	169	159	154
Zinc, slab[1]	4,534	4,638	4,410	4,283	4,065
Centrally planned economy countries:					
Aluminum, primary, refined	3,302	3,374	3,299	3,310	3,352
Cadmium	4	4	4	3	4
Copper, refined[1]	2,242	2,299	2,233	2,222	2,161
Lead, refined[1]	1,423	1,438	1,466	1,456	1,479
Magnesium, primary	74	77	80	82	82
Nickel[2]	185	190	189	187	194
Tin, refined[1]	54	54	55	51	[e]51
Zinc, slab[1]	1,675	1,691	1,716	1,698	1,769
World total:					
Aluminum, primary, refined	[r]15,329	[r]15,981	[r]15,306	14,548	14,194
Cadmium	17	[r]19	17	16	16
Copper, refined[1]	9,520	[r]9,817	9,351	9,477	8,920
Lead, refined[1]	[r]5,470	[r]5,556	[r]5,308	5,220	5,194
Magnesium, primary	280	290	287	266	248
Nickel[2]	697	[r]776	717	656	628
Tin, refined[1]	231	[r]233	224	210	[e]205
Zinc, slab[1]	[r]6,209	[r]6,329	[r]6,126	5,981	5,834
Nonmetals: World:					
Fertilizers:					
Nitrogenous[3] million metric tons of contained N	49,763	53,526	57,433	60,445	60,536
Phosphatic[3] million metric tons of contained P_2O_5	27,876	29,731	31,171	31,520	30,572
Potassic[3] million metric tons of K_2O equivalent	22,964	24,410	24,039	24,145	23,540
Sulfur million metric tons of elemental sulfur equivalent	51,991	54,894	55,708	54,256	[e]51,500
Solid fuels million metric tons of standard coal equivalent	[r]2,480	[r]2,581	[r]2,622	2,660	[e]2,710
Liquid fuels do	[r]3,861	[r]3,947	[r]3,779	3,635	[e]3,540
Natural gas do	[r]1,755	[r]1,837	[r]1,863	1,878	[e]1,860
Hydro, geothermal and nuclear electricity do	274	288	[r]302	320	[e]340
Total do	[r]8,370	[r]8,653	[r]8,566	8,493	[e]8,450

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Primary and secondary combined.

[2]Nickel content of refined nickel, ferronickel, and nickel oxide.

[3]Data are for years ending June 30 of that stated.

Sources: Based on data provided by World Bureau of Metal Statistics (market economy country nonferrous metals except magnesium); Metallgesellschaft AG (centrally planned economy countries nonferrous metals and all magnesium consumption); British Sulphur Corp. (nonmetals); United Nations Yearbook of World Energy Statistics (all mineral fuels for 1978-81); and British Petroleum Co., p. 1c (mineral fuels data for 1982).

Table 6.—Annual investment expenditure in the steel industry for selected countries

(Million dollars unless otherwise specified)

Country or country group	1977	1978	1979	1980	1981
EEC[1]	2,360	2,022	2,098	2,375	2,492
EFTA[2]	476	364	509	[r]840	605
Other countries:					
Australia	140	132	122	220	355
Canada	416	309	319	487	589
Japan	3,824	4,338	2,916	2,865	3,599
New Zealand	NA	NA	6	NA	NA
Spain	476	309	294	237	183
Turkey	304	387	NA	NA	NA
United States	2,850	2,595	3,367	3,400	3,451
Total[3]	10,846	10,456	9,631	[r]10,424	11,274

[r]Revised. NA Not available.

[1]Source reports that values for European Economic Community (EEC) countries are in terms of "million units of account." For the Federal Republic of Germany (included in EEC in this tabulation), the source indicates that for 1976, 823.1 million "units of account" was equivalent to $885.3 million (no conversion rate given for other countries for 1976 and no conversion rate given for any country for 1977-80, and no further explanation is offered).

[2]European Free Trade Association (EFTA) figures exclude data for Switzerland.

[3]Figures have been totaled as if EEC data were in U.S. dollars, in keeping with totals appearing in a graph in source publication (see footnote 1).

Sources: Organization for Economic Cooperation and Development. The Iron and Steel Industry in 1978. Paris, 1980, p.25; The Iron and Steel Industry in 1979. Paris, 1981, p. 22; The Iron and Steel Industry in 1980. Paris, 1982 p. 25; The Iron and Steel Industry in 1981. Paris, 1983, p. 32.

Table 7.—Salient statistics on U.S. foreign investment in mineral industry activities

(Million dollars)

	1980	1981[r]	1982
Direct foreign investment:			
Mining, smelting, refining	6,755	7,217	6,574
Petroleum	47,595	51,223	55,697
Reinvested earnings of incorporated affiliates:			
Mining, smelting, refining	405	118	-141
Petroleum	4,633	4,160	380
Equity and intercompany account flows:			
Mining, smelting, refining	47	217	-1,829
Petroleum	-2,596	-1,117	3,903
Income:			
Mining, smelting, refining	1,321	802	161
Petroleum	13,185	13,292	10,333

[r]Revised.

Sources: U.S. Department of Commerce. U.S. Direct Investment Abroad in 1981, in Survey of Current Business, August 1982, pp. 11-29, for 1980; computer printouts furnished by the Department of Commerce for 1981 and 1982 figures.

Table 8.—World merchant fleet distribution, by type[1]

	1977	1978	1979	1980	1981
Number of vessels:					
Tankers	5,333	5,233	5,260	5,359	5,517
Bulk carriers	4,932	4,651	4,714	4,798	4,987
Freighters[2]	13,176	14,141	14,329	14,242	14,201
Other[3]	655	487	495	468	405
Total	24,096	24,512	24,798	24,867	25,110
Gross tonnage:					
Tankers thousand metric tons	185,405	182,367	183,130	183,858	184,551
Bulk carriers do	103,741	104,291	105,341	106,927	111,820
Freighters[2] do	81,414	87,700	89,643	90,674	92,142
Other[3] do	5,268	4,551	4,535	4,252	3,867
Total do	375,828	378,909	382,649	385,711	392,380
Deadweight tonnage:					
Tankers do	349,976	344,780	345,880	346,329	346,439
Bulk carriers do	178,633	180,436	182,319	185,311	194,368
Freighters[2] do	109,857	117,953	120,494	121,252	123,119
Other[3] do	2,753	2,319	2,209	2,017	1,827
Total do	641,219	645,488	650,902	654,909	665,753

[1]Maritime Administration classification. Tankers include whaling tankers. Vessels shown here as "Other" include combination passenger and cargo and combination passenger and refrigerated cargo. The contribution of these vessels to mineral commodity trade is regarded as unimportant. Data are as of Dec. 31 of year indicated.
[2]Includes refrigerated freighters.
[3]Excludes refrigerated freighters.

Source: U.S. Department of Commerce, Maritime Administration. Merchant Fleets of the World. Annual issue for 1977, and unpublished data supplied by the same agency for 1978-81.

Table 9. —Nonferrous metal prices in the United States

(Average cents per pound unless otherwise specified)

Year and month	Aluminum[1]	Copper[2]	Lead[3]	Zinc[4]	Tin[5]	Silver[6]	Nickel[7]	Cadmium[8]	Cobalt[9]
1978	53.075	65.510	33.653	30.971	r5.867	r5.401	2.084	2.449	11.94
1979	59.395	92.334	52.642	37.296	r7.133	r11.094	2.715	2.758	24.58
1980	69.566	101.416	42.456	37.428	r7.734	r20.632	3.415	2.843	25.00
1981	76.000	83.744	36.531	44.555	r6.554	r10.519	3.429	1.870	[10]
1982:									
January	76.000	77.234	29.674	42.174	7.268	8.031	3.200	1.400	[10]
February	76.000	77.379	28.703	42.716	7.127	8.268	3.200	1.400	12.50
March	76.000	74.462	27.635	39.234	5.969	7.213	3.200	1.259	12.50
April	76.000	74.873	26.059	35.505	5.839	7.311	3.200	1.150	12.50
May	76.000	76.548	26.091	34.671	5.803	6.674	3.200	1.125	12.50
June	76.000	70.088	24.763	34.597	5.016	5.578	3.200	1.020	12.50
July	76.000	69.653	27.175	35.661	5.266	6.497	3.200	1.000	12.50
August	76.000	69.599	25.818	37.792	5.670	7.136	3.200	1.000	12.50
September	76.000	69.665	25.318	39.641	5.785	8.725	3.200	1.000	12.50
October	76.000	71.013	23.191	40.828	5.700	9.458	3.200	1.000	12.50
November	76.000	71.568	21.608	40.393	5.480	9.892	3.200	1.000	12.50
December	76.000	72.880	20.469	38.459	5.503	10.586	3.200	1.000	12.50
Average	76.000	72.909	25.542	38.473	5.869	7.947	3.200	1.113	12.50

rRevised.
[1]U.S. list price, North American producer.
[2]Electrolytic, f.o.b. refinery (not delivered, United States, as erroneously reported in 1981 edition).
[3]Refined lead, nationwide.
[4]Prime Western, f.o.b. East St. Louis.
[5]U.S. dollars per pound, New York dealer.
[6]U.S. dollars per troy ounce, 0.999 fine, New York.
[7]U.S. dollars per pound, major producer cathode.
[8]U.S. dollars per pound, producer.
[9]U.S. dollars per pound, shot-cathode, 250-kilogram lots.
[10]Price was $25 in January and February, 1981; $20 in March through August 1981, inclusive; and suspended from September 1981 through January 1982, inclusive.

Source: American Bureau of Metal Statistics Inc.

Table 10.—Nonferrous metal prices in the United Kingdom[1]

(Average U.S. cents per pound unless otherwise specified)

Year and month	Aluminum[2]	Copper[3]	Gold[4]	Lead[5]	Silver[6]	Tin[7]	Zinc[8]
1978	60.060	61.826	193.228	29.803	r5.419	r5.839	26.870
1979	72.724	90.113	306.686	54.520	r11.110	r7.027	33.588
1980	80.753	99.297	612.562	41.213	r20.872	r7.631	34.482
1981	57.274	79.488	459.715	33.296	r10.524	r6.500	38.932
1982:							
January	50.478	73.057	384.125	29.374	7.980	7.318	37.099
February	49.344	72.393	374.130	28.010	8.284	7.254	37.304
March	46.618	68.511	330.248	27.752	7.237	5.791	35.785
April	45.229	69.024	350.338	26.047	7.293	5.723	33.654
May	44.094	69.294	333.818	26.049	6.672	5.777	34.009
June	41.668	59.009	314.982	23.585	5.569	5.029	31.333
July	43.444	65.355	338.973	25.032	6.442	5.319	32.795
August	43.447	65.837	364.226	23.695	7.066	5.539	32.431
September	43.484	64.690	437.311	23.350	8.737	5.752	33.971
October	43.127	66.299	422.148	22.542	9.399	5.631	34.055
November	43.768	63.490	414.914	20.960	9.784	5.436	32.179
December	44.696	66.825	444.292	20.299	10.572	5.441	30.295
Average	44.966	67.192	375.792	24.656	7.920	5.810	33.734

rRevised.
[1]London Metal Exchange average monthly settlement prices.
[2]Unalloyed ingot 99.5%.
[3]Electrolytic wirebars.
[4]U.S. dollars per troy ounce, final price.
[5]Refined lead.
[6]U.S. dollars per troy ounce, 0.999 fine.
[7]U.S. dollars per pound, Straits tin.
[8]Slab.

Source: American Bureau of Metal Statistics Inc.

Table 11.—Nonferrous metal prices in Canada

Year and month	Copper[1]	Lead[2]	Silver[3]	Zinc[4]
1978	66.376	32.213	r5.406	29.966
1979	92.884	51.133	r11.086	36.888
1980	100.596	42.174	r20.637	37.453
1981	83.973	37.183	r10.528	44.778
1982:				
January	77.650	30.678	8.034	42.554
February	77.250	29.057	8.271	41.804
March	74.290	28.392	7.218	39.791
April	74.730	26.122	7.312	35.621
May	76.810	26.751	6.683	36.398
June	67.700	24.837	5.575	35.277
July	70.030	28.555	6.553	38.698
August	70.000	26.246	7.145	40.154
September	69.900	26.320	8.729	41.071
October	69.480	24.551	9.458	41.460
November	69.800	22.576	9.901	40.851
December	71.100	21.262	10.536	39.564
Average	72.395	26.279	7.951	39.437

rRevised.
[1]For 1978-79, electrolytic wirebar, f.o.b. delivered basis, Canadian points; for 1980-82, domestic producer delivered price for cathode.
[2]Pig lead.
[3]U.S. dollars per troy ounce.
[4]Producers' prices, carload quantities, Cominco Ltd.

Source: American Bureau of Metal Statistics Inc.

Table 12.—Leading world producers of bauxite[1]

(Gross weight, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
Australia	24,293	27,583	27,178	25,541	[2]23,621
Guinea[e]	[r]11,627	[r]11,326	11,862	11,112	[2]10,908
Jamaica	11,739	11,618	12,054	11,682	8,000
U.S.S.R.[e 3]	6,180	6,180	6,180	6,180	6,180
Brazil	1,160	2,388	5,538	5,770	4,500
Yugoslavia	2,565	3,012	3,138	3,249	[2]3,668
Greece	2,663	2,812	3,286	3,216	3,300
Suriname	5,188	5,010	4,646	4,100	2,900
Hungary	2,899	2,976	2,950	2,914	[2]2,627
India	1,663	[r]1,952	1,785	1,923	[2]1,854
France	1,978	[r]1,969	1,921	1,827	1,671
China[e]	1,500	1,500	1,500	1,500	1,500
Guyana[e]	2,425	2,312	1,844	1,681	[2]953
Indonesia	1,008	1,052	1,249	1,203	770
United States	1,669	1,821	1,559	1,510	[2]732
Total[2]	[r]78,557	[r]83,511	86,690	83,408	73,184
Other	[r]3,998	[r]3,480	4,009	3,646	3,149
Grand total[2]	[r]82,555	[r]86,991	90,699	87,054	76,333

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available as of June 29, 1983.
[2]Reported figure.
[3]Includes bauxite equivalent of nepheline syenite concentrates and alunite ore (produced in the U.S.S.R. only).

Table 13.—Leading world producers of aluminum[1]

(Thousand metric tons)

Country	1978	1979	1980	1981	1982[p]
United States	4,358	4,557	4,654	4,489	[2]3,274
U.S.S.R.[e]	1,670	1,750	1,760	1,800	1,875
Canada	1,049	[r]864	[r]1,041	1,116	[2]1,065
Germany, Federal Republic of	740	741	731	729	720
Norway	639	[r]664	[r]653	633	[2]637
France	391	395	432	435	[2]390
China[e]	360	360	360	360	370
Spain	212	259	386	396	365
Australia	263	270	303	379	[2]362
Japan	1,058	[r]1,011	1,091	770	[2]351
Brazil	186	238	260	257	300
Italy	270	269	[r]271	270	270
Netherlands	261	258	[r]258	262	[2]261
Venezuela	[r]74	228	327	314	244
United Kingdom	347	359	375	339	240
Yugoslavia	175	168	161	172	210
Romania	213	217	241	251	208
India	214	211	185	213	204
Total	[r]12,480	[r]12,819	[r]13,489	13,185	11,346
Other	[r]1,651	[r]1,755	[r]1,892	1,887	1,922
Grand total	[r]14,131	[r]14,574	[r]15,381	15,072	13,268

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 18, 1983.
[2]Reported figure.

Table 14.—Leading world producers of chromite[1]

(Gross weight, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R.[e]	2,300	2,300	2,450	2,400	2,450
South Africa, Republic of	3,144	3,297	3,414	2,870	[2]2,164
Albania[e]	990	1,015	[r]1,080	1,140	1,200
Zimbabwe	478	542	552	536	425
Finland	407	435	341	412	400
Turkey	[r]381	[r]371	391	423	370
Philippines	540	556	496	439	355
India	266	[r]310	321	336	340
Brazil	[r]270	340	313	236	190
Total	[r]8,776	[r]9,166	9,358	8,792	7,894
Other	[r]479	[r]422	408	265	291
Grand total	[r]9,255	[r]9,588	9,766	9,057	8,185

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Figures in this table generally conform to the data in the world production table for chromite in volume 1 of the Minerals Yearbook, but the figures for Brazil and for the U.S.S.R. do not because beginning with this year, the referenced table contains crude ore figures for these two countries and not figures representing marketable product as is the case for other countries covered by the table. To use these crude ore figures substantially (and erroneously) inflates the relative importance of these nations in terms of their importance as sources of chromium-bearing materials to the world. Table includes data available through June 8, 1983.

[2]Reported figure.

Table 15.—Leading world producers of mine copper[1]

(Cu content of ore, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
Chile[2]	[r]1,034	[r]1,063	1,068	1,081	[3]1,241
United States[2]	[r]1,358	1,444	1,181	1,538	[3]1,140
U.S.S.R.[e 2]	865	885	900	950	1,000
Canada[2]	659	636	716	691	[3]606
Zambia[2]	643	588	596	588	530
Zaire[2]	424	400	459	505	495
Peru[2]	366	391	367	342	[3]369
Poland	321	325	346	315	338
Philippines	[r]264	298	305	302	280
Australia	222	238	244	226	[3]245
Mexico	87	107	175	230	[3]239
China[e]	200	200	200	200	200
South Africa, Republic of	206	191	201	209	189
Papua New Guinea	199	[2]171	147	165	[3]170
Total	[r]6,848	[r]6,937	6,905	7,342	7,042
Other	[r]756	[r]738	758	833	921
Grand total	[r]7,604	[r]7,675	7,663	8,175	7,963

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through June 1, 1983.

[2]Recoverable.

[3]Reported figure.

Table 16.—Leading world producers of gold[1]

(Thousand troy ounces)

Country	1978	1979	1980	1981[p]	1982[e]
South Africa, Republic of	22,649	22,617	21,669	[2]21,121	[2]21,355
U.S.S.R.[e]	8,000	8,160	8,300	8,425	8,550
Canada	1,735	1,644	1,627	1,673	[2]2,008
United States	999	964	970	1,378	[2]1,447
Brazil	301	319	1,300	1,200	1,447
Australia	648	597	548	568	[2]881
Philippines	587	535	644	753	778
Papua New Guinea	751	630	452	540	564
Chile	102	111	220	400	547
Zimbabwe	399	388	368	371	420
Dominican Republic	343	353	370	408	400
Ghana	402	362	353	[e]330	330
Total	[r]36,916	[r]36,680	36,821	37,167	38,727
Other	[r]2,141	[r]2,127	2,376	4,058	3,986
Grand total	[r]39,057	[r]38,807	39,197	41,225	42,713

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 7, 1983.
[2]Reported figure.

Table 17.—Leading world producers of iron ore, iron ore concentrates, and iron ore agglomerates[1]

(Thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R	[r]246,398	241,739	244,714	242,417	243,400
Brazil	84,985	[r]104,083	114,732	97,860	[2]110,038
Australia	83,134	91,717	95,534	84,661	[2]87,789
China[e]	70,000	75,000	75,000	70,000	70,000
India	38,837	[r]39,859	41,936	41,353	[2]40,902
United States	82,892	87,092	70,730	74,348	[2]35,907
Canada	41,751	59,888	48,754	49,551	[2]34,496
South Africa, Republic of	[r]23,432	31,565	26,312	28,318	[2]24,554
France	33,453	31,627	28,980	21,598	[2]19,396
Liberia	17,989	18,345	18,187	19,704	[2]18,165
Sweden	21,486	26,168	27,184	23,225	[2]16,138
Venezuela	13,515	15,260	16,102	15,531	11,700
Spain	8,580	8,826	9,227	8,565	8,500
Mexico	5,333	6,061	7,631	8,020	[2]8,159
Korea, North[e]	7,100	7,400	8,000	8,000	8,000
Mauritania	6,934	9,373	8,936	8,705	7,000
Chile	6,802	7,118	8,270	7,743	5,806
Total	[r]792,621	[r]861,121	850,229	809,599	749,950
Other	[r]54,027	[r]50,936	47,625	47,138	45,250
Grand total	[r]846,648	[r]912,057	897,854	856,737	795,200

[e]Estmated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 29, 1983.
[2]Reported figure.

Table 18.—Leading world producers of crude steel[1]

(Thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R.	[r]151,453	149,099	147,941	148,444	147,780
Japan	102,105	111,748	111,395	101,675	[2]99,548
United States	124,312	123,687	101,455	109,613	[2]66,137
China	31,780	34,430	37,120	35,600	[2]37,158
Germany, Federal Republic of	41,253	46,040	43,838	41,610	[2]35,906
Italy	24,283	24,250	26,501	24,777	[2]23,981
France	22,841	23,360	23,175	21,258	[2]18,416
Czechoslovakia	15,294	14,817	15,225	15,270	14,992
Poland	19,251	19,218	19,485	15,719	[2]14,500
United Kingdom	20,311	21,438	11,278	15,576	13,698
Spain	11,269	12,304	12,586	12,911	13,150
Romania	11,779	12,909	13,175	13,025	13,000
Brazil	12,107	13,893	15,339	13,230	[2]12,999
Canada	14,899	16,078	15,887	14,811	[2]12,610
Korea, Republic of	4,969	7,610	8,558	10,754	[2]11,753
India	9,987	9,996	9,420	[2]10,780	[2]11,714
Belgium	12,601	13,442	12,320	12,286	[2]9,888
South Africa, Republic of	7,902	8,868	9,068	9,004	[2]8,271
German Democratic Republic	6,976	7,023	7,308	7,467	7,100
Mexico	6,776	7,117	7,156	7,605	[2]7,060
Australia	7,589	8,125	7,593	7,635	[2]6,370
Total	[r]659,737	[r]685,452	655,823	649,050	586,031
Other	[r]55,074	[r]59,420	58,184	56,158	54,981
Grand total	[r]714,811	[r]744,872	714,007	705,208	641,012

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Steel ingots and castings. Table includes data available through June 1, 1983.
[2]Reported figure.

Table 19.—Leading world producers of mine lead[1]

(Pb content of ore, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
United States[2]	530	526	550	446	[3]512
Australia	400	422	397	389	[3]465
U.S.S.R.[e]	410	[r]415	420	425	430
Canada	320	311	297	332	[3]341
Peru[2]	183	174	177	193	205
China[e]	145	155	155	155	155
Mexico[2]	171	174	146	157	[3]146
Yugoslavia	129	130	121	119	115
Morocco	100	116	115	116	110
Bulgaria[e]	117	116	106	100	100
Korea, North[e]	105	100	100	100	100
Total	2,610	[r]2,639	2,584	2,532	2,679
Other	[r]762	767	827	824	785
Grand total	[r]3,372	[r]3,406	3,411	3,356	3,464

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 25, 1983.
[2]Recoverable.
[3]Reported figure.

Table 20.—Leading world producers of manganese ore[1]

(Gross weight, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R.	9,057	10,244	9,750	9,150	9,200
South Africa, Republic of	4,317	5,182	5,695	5,039	[2]5,216
China[e]	[r]1,270	1,500	1,600	1,600	1,600
Gabon	1,710	2,300	2,147	1,488	[2]1,512
India	1,619	1,755	1,645	1,526	[2]1,448
Brazil	1,917	2,259	2,282	2,042	1,300
Australia	[r]1,257	[r]1,724	2,019	1,449	[2]1,132
Mexico	523	493	447	578	[2]509
Ghana	316	272	252	225	132
Morocco	126	136	131	110	94
Japan	104	88	80	87	82
Hungary	114	83	83	71	73
Total	[r]22,330	[r]26,036	26,131	23,365	22,298
Other	[r]312	[r]238	233	178	138
Grand total	[r]22,642	[r]26,274	26,364	23,543	22,436

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 6, 1983.
[2]Reported figure.

Table 21.—Leading world producers of mine nickel[1]

(Thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R.[e]	149	151	154	158	170
Canada	128	126	185	160	[2]89
Australia	82	70	74	74	[2]82
New Caledonia	65	80	87	78	60
Cuba[e]	[r]33	[r]31	37	39	36
Indonesia	31	31	31	31	29
South Africa, Republic of	29	30	26	26	[2]22
Philippines	30	33	47	31	20
Total	[r]547	[r]552	641	597	508
Other	[r]111	[r]129	118	115	100
Grand total	[r]658	[r]681	759	712	608

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Apr. 25, 1983.
[2]Reported figure.

Table 22.—Leading world producers of mine tin[1]

(Sn content of ore, metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
Malaysia	62,650	62,995	61,404	59,938	[2]52,330
U.S.S.R.[e]	34,000	35,000	36,000	36,000	37,000
Indonesia	[r]27,437	[r]29,434	32,529	35,238	36,500
Bolivia	30,881	27,648	27,291	29,830	[2]26,773
Thailand	30,186	33,962	33,685	31,474	26,000
China[e]	14,000	14,000	14,600	15,000	15,000
Australia	11,864	[r]12,571	11,588	12,267	[2]12,700
Brazil	6,341	7,005	6,930	8,297	9,500
United Kingdom	3,132	[r]2,373	2,982	3,869	4,000
South Africa, Republic of	2,886	2,697	2,913	2,811	[2]3,035
Nigeria	2,935	2,750	2,569	2,300	2,700
Zaire	4,390	3,879	3,159	2,468	2,240
Total	[r]230,702	[r]234,314	235,650	239,492	227,778
Other	10,406	10,993	11,614	13,083	13,336
Grand total	[r]241,108	[r]245,307	247,264	252,575	241,114

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 19, 1983.
[2]Reported figure.

Table 23.—Leading world producers of mine zinc[1]

(Zn content of ore, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
Canada	1,067	1,100	895	911	[2]1,033
U.S.S.R.[e]	770	770	785	790	795
Australia	473	[r]529	495	518	[2]665
Peru	403	432	488	499	[2]541
United States	303	267	317	312	[2]300
Japan	275	243	238	242	[2]250
Mexico	245	246	238	212	[2]232
Sweden	163	170	167	181	[2]185
Ireland	176	212	229	117	167
Spain	147	143	183	182	167
China[e]	160	160	160	160	160
Poland[e]	194	183	188	147	145
Korea, North[e]	145	145	140	140	140
Brazil	59	98	105	97	101
South Africa, Republic of	65	54	79	87	[2]92
Bulgaria	88	85	87	87	87
Germany, Federal Republic of	97	97	100	92	[2]87
Yugoslavia	104	102	95	89	87
Greenland	82	87	52	78	77
Total	[r]5,016	[r]5,123	5,041	4,941	5,311
Other	[r]838	[r]749	716	716	736
Grand total	[r]5,854	[r]5,872	5,757	5,657	6,047

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 29, 1983.
[2]Reported figure.

Table 24.—Leading world producers of hydraulic cement[1]

(Thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R	126,956	123,019	125,049	127,169	[2]124,000
China	65,239	73,900	79,859	84,005	94,000
Japan	84,882	87,804	87,957	84,832	84,005
United States	77,546	77,931	69,589	66,163	[2]59,014
Italy	38,232	39,289	41,772	41,553	[2]42,000
Germany, Federal Republic of	35,303	36,664	35,546	[2]33,029	[2]32,024
Spain (including Canary Islands)	30,233	[r]27,912	28,009	28,751	29,000
France	28,025	28,825	29,104	28,230	26,127
Brazil	22,280	24,874	27,193	28,500	25,400
India	19,560	18,264	17,700	20,761	22,498
Mexico	14,056	15,178	16,260	18,066	18,000
Korea, Republic of	15,133	16,413	15,631	15,617	17,887
Poland	21,700	19,176	18,443	14,225	16,040
Turkey	15,344	13,784	12,875	15,043	15,100
Romania	14,688	15,598	15,611	14,750	14,970
Greece	11,280	12,098	13,150	13,500	13,500
Taiwan	11,460	11,898	14,062	14,343	[2]13,432
United Kingdom	15,916	16,140	14,808	12,828	12,973
German Democratic Republic	12,521	12,273	12,444	12,500	12,500
Total	[r]660,354	[r]671,040	675,062	673,865	672,470
Other	[r]192,592	[r]201,045	209,262	218,125	219,638
Grand total	[r]852,946	[r]872,085	884,324	891,990	892,108

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 8, 1983.
[2]Reported figure.

Table 25.—Leading world producers of diamond[1]

(Thousand carats)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R.[e]	10,550	10,700	10,850	10,600	10,600
South Africa, Republic of	7,727	8,384	8,520	9,526	[2]9,154
Zaire	11,243	8,734	10,235	9,000	9,000
Botswana	2,799	4,394	5,101	4,961	[2]7,769
China[e]	NA	NA	1,800	1,900	2,000
Angola	650	841	1,480	1,400	1,400
Brazil	620	620	667	1,089	1,150
Namibia	1,898	1,653	1,560	1,248	[2]1,014
Ghana	1,423	1,253	1,258	836	[2]680
Total	[r]36,910	[r]36,579	41,471	40,560	42,767
Other	[r]2,713	[r]2,851	2,406	1,997	2,399
Grand total	39,623	[r]39,430	43,877	42,557	45,166

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Gem and industrial grades undifferentiated. Table includes data available through June 3, 1983.
[2]Reported figure.

Table 26.—Leading world producers of nitrogen in ammonia[1]

(N content, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R	11,300	[r]12,200	12,600	12,900	13,100
United States	[r]12,854	13,989	14,736	14,169	[2]11,559
China[e]	[r]7,637	[r]8,821	9,990	9,860	10,257
India[3]	2,220	2,256	2,221	3,193	3,650
Canada	1,926	1,981	1,996	2,181	2,509
Romania	2,257	[r]2,335	2,248	2,200	2,150
France	[r]2,017	2,150	2,085	2,000	2,000
Germany, Federal Republic of	1,955	2,161	2,044	1,961	2,000
Mexico	1,304	1,359	1,548	1,725	1,980
Netherlands	2,148	[r]1,916	1,874	1,814	1,900
United Kingdom	1,600	1,666	1,633	1,780	1,780
Japan	[r]2,368	[r]2,328	2,110	1,833	1,670
Poland	1,611	1,525	1,543	1,389	1,300
German Democratic Republic	1,137	1,078	1,182	1,205	1,200
Italy	[r]1,514	[r]1,454	1,405	1,207	1,200
Total	[r]53,848	[r]57,219	59,215	59,417	58,255
Other	[r]13,375	[r]14,025	14,734	14,585	14,294
Grand total	[r]67,223	[r]71,244	73,949	74,002	72,549

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 25, 1983.
[2]Reported figure.
[3]Data given are for years beginning Apr. 1 of that stated.

Table 27.—Leading world producers of phosphate rock[1]

(Thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
United States	50,037	51,611	54,415	53,624	[2]37,414
U.S.S.R.[e]	[r]23,900	[r]24,400	[r]25,300	[r]25,600	26,100
Morocco[3]	19,713	20,032	18,824	18,562	[2]17,754
China[e]	[r]4,695	[r]8,517	[r]10,726	[r]11,500	12,500
Jordan	2,303	2,825	3,911	4,244	[2]4,431
Tunisia	3,712	4,154	4,582	4,596	[2]4,196
South Africa, Republic of	2,699	3,221	3,185	2,618	[2]3,173
Togo	2,827	2,920	2,933	2,215	[2]2,128
Total	[r]109,886	[r]117,680	123,876	122,959	107,696
Other	[r]15,136	[r]14,330	15,728	14,565	14,937
Grand total	[r]125,022	[r]132,010	139,604	137,524	122,633

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes only phosphate rock; Thomas slag and guano are excluded. Table includes data available through Apr. 13, 1983.
[2]Reported figure.
[3]Includes output from Western Sahara.

Table 28.—Leading world producers of marketable potash[1]

(K_2O equivalent, thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R.	8,193	6,635	8,064	8,449	9,000
Canada	6,340	7,074	7,532	6,549	[2]5,196
German Democratic Republic	3,323	3,395	3,422	3,490	3,500
Germany, Federal Republic of	2,470	2,616	2,737	2,591	2,600
France	1,795	[r]1,921	1,894	1,831	1,823
United States	2,253	2,225	2,239	2,156	[2]1,784
Total	24,374	[r]23,866	25,888	25,066	23,903
Other	[r]1,748	[r]1,902	1,967	1,980	2,827
Grand total	[r]26,122	[r]25,768	27,855	27,046	26,730

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Apr. 20, 1983.
[2]Reported figure.

Table 29.—Leading world producers of salt[1]

(Thousand metric tons)

Country	1978	1979	1980	1981[p]	1982[e]
United States (including Puerto Rico)	[r]38,915	41,567	36,630	35,303	[2]34,333
China	19,530	14,770	17,280	18,320	15,970
U.S.S.R.[e]	14,500	14,300	14,600	15,200	15,400
Germany, Federal Republic of	12,658	15,089	11,395	12,541	11,520
India	6,700	[r]7,035	8,010	8,923	9,980
Canada	6,452	6,881	7,029	7,240	[2]8,074
Mexico	5,635	6,169	6,575	7,953	8,000
United Kingdom	7,310	7,819	7,155	6,720	6,900
France	6,283	8,057	[e]7,103	6,636	6,650
Australia	5,766	5,172	5,315	5,300	5,625
Romania	4,739	4,720	5,055	5,000	4,990
Italy	4,931	[e]5,669	5,267	4,564	4,540
Netherlands	2,939	3,951	3,464	3,578	4,400
Poland	4,393	4,429	4,534	4,271	4,260
Spain	3,369	[r]3,448	3,508	3,710	3,630
Brazil	3,299	[r]3,554	3,837	3,605	3,540
German Democratic Republic	2,741	[r]3,052	3,128	3,113	3,050
Turkey	[r]939	[r]1,063	1,169	1,320	1,360
Japan	1,073	[r]1,079	1,112	1,028	1,090
Argentina	700	620	1,004	938	910
Egypt	755	616	636	650	[2]829
Bahamas	1,633	440	684	970	[2]816
Pakistan	640	704	695	733	770
Colombia	837	752	838	715	720
Total	[r]156,737	[r]160,956	156,023	158,331	157,357
Other	[r]11,511	[r]12,473	12,374	12,021	11,339
Grand total	[r]168,248	173,429	168,397	170,352	168,696

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 15, 1983.
[2]Reported figure.

Table 30.—Leading world producers of elemental sulfur[1]

(Thousand metric tons)

Country	1979				1980				1981[p]				1982[e]			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
U.S.S.R.[e]	r 2,700	3,500	r3,040	r9,240	r 2,800	3,550	r3,240	r9,590	r 2,850	3,600	r3,340	r9,790	2,850	3,700	3,440	9,990
United States	6,357	400	5,344	12,101	6,390	322	5,154	11,866	6,348	307	5,490	12,145	3 4,210	4265	5,312	9,787
Canada	--	12	7,015	7,027	--	12	7,248	7,260	--	10	6,789	6,799	--	420	6,244	6,264
Poland	4,830	--	r365	r5,195	5,185	--	350	5,535	4,773	--	350	5,123	4,920	--	350	5,270
Japan	--	300	2,591	2,891	--	311	2,473	2,784	--	293	2,280	2,573	--	4276	2,200	2,476
China[e]	200	r1,500	r300	r2,000	200	1,700	r300	r2,200	200	r1,800	r300	2,300	200	1,800	300	2,300
France	--	--	r2,288	r2,288	--	--	2,216	2,216	--	--	2,042	2,042	--	--	2,101	2,101
Mexico	1,773	--	352	2,125	1,700	--	517	2,217	1,652	--	526	2,178	3 41,391	--	525	1,916
Germany, Federal Republic of	--	203	1,447	1,650	--	222	1,577	1,799	--	213	1,529	1,742	--	200	1,585	1,785
Spain	--	1,091	133	1,224	--	1,096	140	1,236	--	1,118	150	1,268	--	1,100	138	1,238
Saudi Arabia	1	--	125	126	1	--	460	461	--	--	600	600	--	--	700	700
South Africa, Republic of	--	243	125	368	--	493	125	618	--	502	127	629	--	500	100	600
Romania[e]	--	400	130	530	--	400	140	540	--	400	150	550	--	400	150	550
Italy	19	302	250	571	23	331	250	604	20	261	263	544	18	250	220	488
Yugoslavia	--	190	e205	395	--	261	e205	466	--	286	e174	460	--	290	173	463
Finland	--	151	293	444	--	144	277	421	--	184	264	448	--	184	264	448
Sweden	--	282	166	448	--	249	e170	419	--	e249	e170	e419	--	249	170	419
Bulgaria[e]	--	315	75	390	--	300	70	370	--	300	70	370	--	300	70	370
German Democratic Republic[e]	--	10	350	360	--	10	350	360	--	10	350	360	--	10	350	360
Belgium[e]	--	--	270	270	--	--	270	270	--	--	270	270	--	--	270	270
Norway	--	119	e46	165	--	193	e46	239	--	e190	e46	236	--	190	46	236
Korea, North[e]	--	255	10	265	--	r250	10	r260	--	r225	10	r235	--	200	10	210
Australia	--	29	e151	180	--	29	e151	180	--	30	e151	181	--	30	157	187
Iraq	550	--	r e40	r590	700	--	e40	740	145	--	e40	185	100	--	40	140
United Kingdom	--	--	113	113	--	--	e134	e134	--	--	129	e129	--	--	139	139
Chile	77	--	27	104	88	--	e27	115	115	--	e28	143	109	--	26	135

Portugal	--	151	1	152	--	155	2	157	--	135	2	137	--	130	2	132
India	--	r27	r e119	r146	--	34	e120	154	--	23	e96	119	--	25	105	130
Total	r16,507	r9,480	r25,371	r51,358	17,087	10,062	26,062	53,211	16,103	10,136	25,736	51,975	13,798	10,119	25,187	49,104
Other	r147	r323	r1,357	r1,827	148	326	1,324	1,798	136	303	1,149	1,588	134	312	1,110	1,556
Grand total	r16,654	r9,803	r26,728	r53,185	17,235	10,388	27,386	55,009	16,239	10,439	26,885	53,563	13,932	10,431	26,297	50,660

eEstimated. pPreliminary. rRevised.

[1]Includes all recorded production of sulfur, regardless of the form in which it is recovered. Thus, it includes elemental sulfur, whether mined by conventional methods or by the Frasch process, as well as (1) elemental sulfur and the S content of compounds such as H_2S, SO_2, and H_2SO_4 recovered as a principal product of pyrite mining and as a byproduct of the recovery of crude oil and natural gas and as a byproduct of petroleum refining, coal treatment, and metal smelting and/or refining; and (2) sulfur recovered from tar sands, spent oxides, and other miscellaneous sources. Table includes data available through May 25, 1983.

[2]Includes Frasch process sulfur as follows, in thousand metric tons: Poland: 1979—4,310, 1980—4,667, 1981—4,250, and 1982—4,428; the U.S.S.R. (estimated): 1979—800, 1980—800, 1981—800, and 1982—800; and total of individually listed countries and grand total: 1979—13,790, 1980—14,257, 1981—13,240, and 1982—10,929. The balance is mined elemental sulfur.

[3]Entirely Frasch process sulfur.

[4]Reported figure.

Table 31.—Leading world producers of coal (all grades)[1]

(Million metric tons)

Country	1979			1980			1981[p]			1982[e]		
	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total
United States	38	671	709	42	712	754	46	701	747	50	706	[2]756
U.S.S.R	165	554	719	163	553	716	160	544	704	[2]162	[2]556	[2]718
China	[3]	635	635	[3]	620	620	[3]	620	620	[3]	[2]651	[2]651
German Democratic Republic	256	--	256	258	--	258	267	--	267	[2]271	--	[2]271
Poland	38	201	239	37	193	230	36	163	199	[2]38	[2]189	[2]227
Germany, Federal Republic of	131	86	217	130	87	217	131	88	219	[2]127	[2]89	[2]216
Australia	33	83	116	33	85	118	33	112	145	[2]38	[2]119	[2]157
India	3	104	107	5	114	119	6	125	131	[2]7	[2]128	[2]135
South Africa, Republic of	--	104	104	--	115	115	--	130	130	--	140	140
Czechoslovakia	97	28	125	96	28	124	96	27	123	[2]100	27	127
United Kingdom	--	[r]121	[r]121	--	130	130	--	127	127	--	125	125
Yugoslavia	42	[4]	42	47	[4]	47	52	[4]	52	[2]54	[4]	54
Korea, North[e]	[3]	44	44	[3]	45	45	[3]	45	45	[3]	45	45
Canada	5	28	33	6	31	37	7	33	40	[2]7	[2]35	[2]42
Romania	25	8	33	27	8	35	[e]27	[e]8	[e]35	28	8	36
Bulgaria	28	[4]	28	31	[4]	31	30	[4]	30	[2]32	[4]	[2]32
Greece	24	--	24	23	--	23	27	--	27	[2]27	--	[2]27
Hungary	23	3	26	23	3	26	23	3	26	23	3	26
France	2	19	21	3	18	21	3	19	22	3	17	20
Total	910	[r]2,689	[r]3,599	924	2,742	3,666	944	2,745	3,689	967	2,838	3,805
Other	[r]43	[r]100	[r]143	38	101	139	48	103	151	56	105	161
Grand total	[r]953	[r]2,789	[r]3,742	962	2,843	3,805	992	2,848	3,840	1,023	2,943	3,966

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Sept. 30, 1983.

[2]Reported figure.

[3]Output small; included under "Bituminous and anthracite."

[4]Less than 1/2 unit.

Table 32.—Leading world producers of marketed natural gas[1]

(Billion cubic feet)

Country	1978	1979	1980	1981[p]	1982[e]
United States	19,975	[r]20,470	20,380	20,180	[2]18,530
U.S.S.R	13,144	14,359	15,369	16,430	[2]17,693
Netherlands	3,133	[r]3,407	3,267	3,240	3,000
Canada	3,128	3,335	3,068	2,399	[2]2,447
Mexico	745	915	1,129	1,214	[2]1,279
United Kingdom	1,382	1,410	1,317	1,321	[2]1,263
Romania	1,212	1,161	1,199	[e]1,200	1,100
Norway	526	759	922	920	[2]897
Indonesia	384	399	696	720	750
Germany, Federal Republic of	707	725	665	666	[2]594
Venezuela	520	576	589	584	[2]527
Italy	485	476	443	496	[2]515
Algeria	490	[r]516	411	466	470
China	485	512	504	450	[2]414
Australia	259	296	338	401	[2]409
Saudi Arabia	335	[e]400	[e]450	[e]500	400
United Arab Emirates (Abu Dhabi and Dubai)	[r]124	[r]64	139	358	370
Brunei	[r]311	[r]307	345	343	338
Argentina	260	284	270	294	[2]334
Pakistan	196	240	287	316	300
German Democratic Republic	302	[e]302	[e]302	[e]302	290
France	278	274	266	250	[2]258
Hungary	259	230	217	212	[2]240
Poland	282	259	224	205	195
Kuwait	221	334	260	196	158
Iran	687	500	[e]230	100	150
Total	[r]49,830	[r]52,510	53,287	53,763	52,921
Other	[r]1,527	[r]1,850	1,553	1,728	1,862
Grand total	[r]51,357	[r]54,360	54,840	55,491	54,783

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Comprises all gas collected and utilized as a fuel or as a chemical industry raw material as well as that used for gas lift in fields, including gas used in oilfields and/or gasfields as a fuel by producers, even though it is not actually sold. Excludes gas produced and subsequently vented, flared, or reinjected to reservoirs. Table includes data available through Sept. 30, 1983.

[2]Reported figure.

Table 33.—Leading world producers of natural gas liquids[1]

(Million 42-gallon barrels)

Country[2]	1978	1979	1980	1981[p]	1982[e]
United States	572	579	575	588	[3]566
U.S.S.R.[e]	119	[r]125	[r]127	134	145
Canada	104	123	115	120	[3]117
Saudi Arabia	91	100	105	140	100
Mexico	44	57	71	88	95
Algeria	32	34	34	[e]68	70
United Arab Emirates (Abu Dhabi, Dubai, Sharjah)	5	15	36	[e]40	55
Venezuela	22	25	22	20	[3]21
Kuwait	19	[r]46	35	22	16
Total	1,008	[r]1,104	1,120	1,220	1,185
Other	[r]82	[r]71	76	87	84
Grand total	[r]1,090	[r]1,175	1,196	1,307	1,269

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Every effort has been made to include only those natural gas liquids produced by natural gas processing plants and to exclude natural gas liquids obtained from field treatment facilities including wellhead separators, because the latter are normally blended with crude oil and thus are included in crude oil output statistics. In some cases, however, sources do not clearly specify whether data presented represent only output of natural gas processing plants or if they include field output. Thus, some of the figures may include field condensate. Table includes data available through Sept. 30, 1983.

[2]In addition to the countries listed, China, Czechoslovakia, the German Democratic Republic, the Federal Republic of Germany, and Italy may also produce natural gas liquids in substantial quantities, but available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

Table 34.—Leading world producers of crude oil[1]

(Million 42-gallon barrels)

Country	1978	1979	1980	1981[p]	1982[e]
U.S.S.R	4,201	4,304	4,434	4,475	[2]4,506
United States	3,178	3,114	3,147	3,128	[2]3,165
Saudi Arabia[3]	3,030	3,479	3,614	3,580	[2]2,309
Mexico	441	533	708	844	[2]1,002
Iran	1,913	1,121	550	692	750
China	760	775	773	739	[2]745
Venezuela	790	860	793	768	[2]692
United Kingdom	389	562	586	655	[2]611
Indonesia	[r]599	580	577	585	[2]488
Nigeria	[r]692	[r]840	753	525	472
Canada	478	545	523	468	462
United Arab Emirates	668	668	624	548	[2]455
Libya	724	763	670	408	438
Iraq	953	1,252	969	[e]326	310
Kuwait[3]	778	913	609	411	[2]301
Algeria	424	421	362	295	250
Egypt	176	180	227	234	[2]246
Norway	127	140	182	175	[2]183
Argentina	165	173	180	181	[2]179
India	93	94	76	117	[2]150
Australia	158	160	140	135	[2]136
Oman	115	108	104	120	[2]123
Qatar	177	185	173	146	[2]120
Malaysia	79	103	101	94	98
Brazil	61	62	68	78	[2]95
Romania	103	92	86	86	88
Ecuador	78	78	75	77	[2]77
Peru	55	70	71	70	[2]72
Trinidad and Tobago	84	78	78	69	[2]65
Brunei	[r]75	[r]85	86	64	62
Syria	62	69	61	59	[2]56
Gabon	76	71	64	54	[2]56
Total	[r]21,702	22,478	21,464	20,206	18,762
Other	[r]388	[r]429	436	458	462
Grand total	[r]22,090	[r]22,907	21,900	20,664	19,224

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Sept. 30, 1983.

[2]Reported figure.

[3]Includes the country's share of production from the Kuwait-Saudi Arabia Partitioned Zone.

Table 35.—Leading world producers of refined oil[1]

(Million 42-gallon barrels)

Country	1978	1979	1980	1981[p]	1982[e]
United States (including Puerto Rico and Virgin Islands)	5,957	5,860	5,619	5,219	4,959
U.S.S.R	3,412	3,513	3,620	3,703	3,783
Japan	1,688	1,696	1,611	1,464	[2]1,337
Germany, Federal Republic of	788	953	875	795	[2]733
France	928	978	881	720	[2]617
Italy	865	885	721	654	609
Canada	664	712	694	696	[2]589
United Kingdom	726	725	637	577	572
China[e]	600	470	470	450	450
Mexico	327	358	425	471	[2]444
Brazil	400	418	405	[e]403	360
Spain (including Canary Islands)	351	355	367	358	333
Saudi Arabia[3]	294	315	336	345	[2]323
Venezuela	362	369	341	319	[2]318
Singapore	250	264	262	312	[2]305
Netherlands	427	470	400	363	[2]263
India	196	203	191	225	235
Australia	226	232	227	230	[2]224
Belgium	247	247	239	219	[2]219
Netherlands Antilles	215	[r]209	214	218	207
Iran	249	[e]224	[e]218	100	200
Argentina	173	182	190	190	[2]183
Korea, Republic of	174	189	183	183	[2]178
Romania	175	182	182	[e]182	176
Algeria	57	58	83	[e]120	150
German Democratic Republic	139	142	144	143	144
Taiwan	109	107	113	122	[2]121
South Africa, Republic of	106	105	108	116	116
Egypt	83	98	104	106	[2]112
Greece	86	113	105	109	[2]109
Yugoslavia	100	109	106	95	104
Czechoslovakia	119	125	123	120	103
Kuwait[3]	[r]131	[r]151	123	102	[2]102
Turkey	89	81	91	95	102
Poland	113	110	106	101	[2]101
Indonesia	103	120	130	118	[2]99
Sweden	[r]114	[r]123	133	100	95
Total	[r]21,043	[r]21,451	20,777	19,843	19,075
Other	[r]1,793	[r]1,889	1,852	1,790	1,777
Grand total	[r]22,836	[r]23,340	22,629	21,633	20,852

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Sept. 30, 1983.
[2]Reported figure.
[3]Includes the country's share of production from the Kuwait-Saudi Arabia Partitioned Zone.

The Mineral Industry of Albania

By Walter G. Steblez[1]

In 1982, Albania's centrally planned economy grew more modestly than in 1981. National income rose by 4.5% and industrial production reportedly increased by 4.7% over that of 1981, but the actual 1981 rate of increase of industrial production was 3.3% higher than that of 1982. The shortfall in the increase planned for 1982 was 3.8%. A number of branches of the mining and metallurgical industries, however, registered relatively high output increases.

To ensure adequate imports of Western technology and know-how, which must be purchased with hard currency, Albania has been forced to export large quantities of raw materials annually. The country's industrialization has been proceeding at a forced, but uneven pace owing to the withdrawal of China's support in 1978 as well as to unrealistically high production plans. To compete in export markets, Albania's investment priority has been focused on the development of heavy industry with mining, fuels, and machine building as the main components. In 1982, the machine-building industry reportedly grew by 17% and was able to supply the mining industry with a wide variety of mining equipment. Albanian mining was labor-intensive but the growth in the supply of domestically manufactured machinery and equipment allowed full mechanization of several mining enterprises.

The Government's exploration plan for 1982 was reported to have been sucessfully met. The goal for increasing industrial reserves of copper was overfulfilled by 7.5%, that of coal by 45.5%, nickeliferous iron by 34.2%, and nickel silicate by 26.7%. The discovery of deposits of asbestos, clays (including kaolin), bituminous coal, pyrite, and polymetallic ores was reported.

PRODUCTION

Chromite remained Albania's most important mineral commodity. The country was a leading world producer of chromite and the mineral was the leading foreign exchange earner.

Albania also produced copper, iron, nickel, and bauxite as well as several nonmetallic industrial minerals. The production of coal and other fossil fuels has made Albania a net exporter of energy.

In 1982, the official production plan was not met for high-grade chromite, steel, and petroleum, and copper mining experienced difficulties for the second straight year. On the other hand, good production results were reported for natural gas, coal, iron concentrates, and high-carbon ferrochrome.

Table 1.—Albania: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Asphalt and bitumen, natural[e 3] thousand tons	1,600	1,650	1,780	1,800	1,800
Cement, hydraulic do	800	840	[e]1,000	[e]1,100	1,000
Chromium: Chromite, gross weight do	990	1,015	[e]1,077	[e]1,140	1,200
Coal: Lignite[e] do	1,200	1,430	1,540	1,600	1,740
Cobalt, mine output, metal content[e 4]	306	306	330	340	340
Copper:					
Mine output, metal content[e]	11,500	14,000	15,300	15,500	16,200
Metal, primary and secondary:					
Smelter[e]	9,500	9,700	9,900	10,000	11,200
Refined[e]	7,000	7,500	7,700	9,000	9,000
Gas, natural, gross production[e 5] million cubic feet	12,500	13,000	13,200	13,500	15,800
Iron and steel:					
Iron ore, nickeliferous:					
Gross weight	510,000	530,000	[e]550,000	[e]600,000	600,000
Iron content	178,500	185,500	192,500	200,000	200,000
Ferroalloys, ferrochromium[e]	NA	NA	3,500	28,000	30,000
Semimanufactures[e]	27,000	28,000	30,000	31,000	34,000
Nickel, mine output, metal content[e]	5,100	5,300	5,500	5,600	5,800
Nitrogen: N content of ammonia	76,000	72,000	75,000	76,000	76,000
Petroleum and refinery products:					
Crude:					
As reported million tons	1,900	1,600	1,700	1,700	1,700
Converted thousand 42-gallon barrels	12,700	10,700	11,300	11,300	11,300
Refinery products:[e]					
Gasoline do	1,500	1,600	1,700	1,700	1,700
Kerosine do	470	500	540	600	600
Distillate fuel oil do	2,250	2,270	2,400	2,300	2,300
Residual fuel oil do	3,400	3,600	3,800	3,500	3,500
Lubricants do	90	100	105	120	120
Other do	2,500	2,600	2,700	3,000	3,000
Total[e] do	10,210	10,670	11,245	11,220	11,220
Salt[e]	50,000	62,500	66,500	66,500	66,500
Sodium compounds, n.e.s.: Sodium carbonate, calcined (soda ash)[e]	23,200	23,300	25,000	25,500	25,000

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through Sept. 23, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) are undoubtedly produced, but output is not reported quantitatively and available information is inadequate to make reliable estimates of output levels. Also, metallic nickel production reportedly began in 1978, but data on the level of production are not available.

[3]Includes petroleum-refinery-produced asphalt and bitumen.

[4]Calculated from reported and estimated weight of nickeliferous ore; the amount of cobalt recovered, if any, is conjectural.

[5]Separate data on marketable production are not available, but gross and marketed output are regarded as nearly equal.

[6]Sums of listed products only; no estimates have been made for other products produced.

TRADE

Albania's planned 1982 increase of 16.9% in foreign trade was not realized owing to unrealistic goals in a depressed world market. In 1982, a number of commercial agreements were reported with Albania's main centrally planned economic trading partners—Czechoslovakia, Yugoslavia, and Poland. Heavy producer durables were to be exported to Albania in exchange for chrome ore, asphalt, nickeliferous iron ore, and other mineral raw materials.

Commerce with Yugoslavia, Albania's main trading partner, increased over the import-export levels of 1981. Albanian imports from Yugoslavia were $73.5 million, and exports to Yugoslavia amounted to $74.4 million. Yugoslav exports of iron and steel, nonferrous products, machine-building and metalworking equipment, and electrically driven machines amounted to about 56% of total Yugoslav exports to Albania for 1982. Albania's main export was electric power followed by mineral raw materials and agricultural products.

Table 2.—Albania: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	12	NA		
Aluminum: Metal including alloys:				
Unwrought	25	NA		
Semimanufactures	2	NA		
Chromium: Ore and concentrate	509,122	453,550	11,913	Yugoslavia 223,498; West Germany 36,112; Japan 30,798.
Copper:				
Matte and speiss including cement copper value, thousands	--	$1	--	All to Greece.
Metal including alloys:				
Scrap	--	174	--	Do.
Unwrought	1,429	207	--	France 172; West Germany 25.
Semimanufactures	805	207	--	Yugoslavia 197.
Iron and steel:				
Metal:				
Pig iron, cast iron, related materials	--	150	--	All to Yugoslavia.
Ferroalloys:				
Ferrochromium	NA	32,679	--	West Germany 8,725; Netherlands 8,184; Italy 6,076.
Unspecified	3,359	23	--	All to Austria.
Semimanufactures:				
Bars, rods, angles, shapes, etc	1,651	20	--	Do.
Universals, plates, sheets	19	276	--	All to Pakistan.
Rails and accessories	14	NA		
Wire	--	10		All to Pakistan.
Tubes, pipes, fittings	300	NA		
Castings and forgings, rough	32	NA		
Lead: Metal including alloys, unwrought	5	NA		
Mercury 76-pound flasks	203	NA		
Nickel: Matte and speiss	--	3	--	All to Norway.
Silver: Waste and sweepings[2] value, thousands	--	$305	--	All to Italy.
Tin: Metal including alloys, unwrought	12	5	--	Do.
NONMETALS				
Cement	69,144	25,550	--	Yugoslavia 24,885; Libya 665.
Clays and clay products: Products:				
Nonrefractory	65	NA		
Refractory including nonclay brick	341	NA		
Fertilizer materials: Manufactured, nitrogenous	10,590	1,572	--	Yugoslavia 1,072; Greece 500.
Graphite, natural	7	NA		
Pyrite, unroasted	22,914	22,537	--	Italy 17,239; Yugoslavia 5,298.
Salt and brine	9,794	941	--	All to Yugoslavia.
Sodium and potassium compounds, n.e.s.:				
Sodium hydroxide	201	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,667	NA		
Worked	405	NA		
Quartz and quartzite	--	546	--	All to Italy.
Sulfur: Elemental, crude including native and byproduct	987	NA		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,312	908	--	Yugoslavia 600; Austria 308.
Coal: Anthracite and bituminous	27	NA		
Petroleum refinery products:				
Gasoline thousand 42-gallon barrels	413	1,006	--	Italy 463; France 282; Netherlands 119.
Kerosine and jet fuel 42-gallon barrels	1,109	1,992	--	All to Hungary.
Distillate fuel oil do.	234,863	443,474	--	Italy 347,233; Greece 51,981; France 44,260.
Lubricants do.	22,078	NA		
Residual fuel oil do.	9,717	NA		
Bitumen and other residues do.	487,303	136,453	--	Italy 113,686; Greece 12,320; Libya 9,696.
Petroleum coke do.	46,377	710	--	All to Italy.
Unspecified do.	438,000	361,000	--	All to Poland.

[p]Preliminary. NA Not available.

[1]Owing to the lack of official trade data published by Albania, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]May include other precious metals.

Table 3.—Albania: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	188	30	--	Austria 25; Switzerland 5.
Metal including alloys:				
Scrap	10	NA		
Unwrought	707	721	--	Hungary 544; Greece 149.
Semimanufactures	976	1,645	--	Yugoslavia 966; Hungary 397; Austria 113.
Chromium: Oxides and hydroxides	36	20	--	All from Italy.
Copper:				
Sulfate	300	NA		
Metal including alloys:				
Scrap	399	366	--	All from Yugoslavia.
Unwrought	38	NA		
Semimanufactures	767	[2]580	--	Yugoslavia 163; West Germany 159; Sweden 121.
Iron and steel:				
Iron ore and concentrate, including roasted pyrite	--	30,758	--	All from Morocco.
Metal:				
Pig iron, cast iron, related materials	1,125	8,022	--	West Germany 7,400; France 600.
Ferroalloys:				
Ferrochromium	NA	220	--	All from Yugoslavia.
Ferromanganese	NA	1,847	--	Yugoslavia 1,600; West Germany 247.
Ferrosilicomanganese	NA	78	--	All from Yugoslavia.
Ferrosilicon	NA	2,441	--	Do.
Unspecified	4,637	252	--	West Germany 247.
Steel, primary forms	1,699	67	--	All from Italy.
Semimanufactures:				
Bars, rods, angles, shapes, etc	65,558	30,133	--	Czechoslovakia 15,000; Poland 11,249; West Germany 1,596.
Universals, plates, sheets	27,093	11,898	--	Hungary 3,010; West Germany 2,636; Poland 2,575.
Hoop and strip	1,201	370	--	West Germany 316; Greece 26; Italy 24.
Rails and accessories	7,723	4,397	--	All from Italy.
Wire	830	1,435	--	Yugoslavia 1,101; West Germany 100; Hungary 83.
Tubes, pipes, fittings	19,226	16,803	--	Yugoslavia 5,733; Japan 4,402; Greece 2,517.
Lead:				
Oxides	1	40	--	All from West Germany.
Metal including alloys:				
Unwrought	501	151	--	All from Yugoslavia.
Semimanufactures	25	265	--	Yugoslavia 169; Belgium-Luxembourg 96.
Magnesium: Metal including alloys:				
Unwrought	--	7	--	All from Yugoslavia.
Semimanufactures	--	2	--	All from West Germany.
Manganese: Oxides	--	120	--	All from Greece.
Mercury 76-pound flasks	290	[3]	--	[3].
Metalloids, unspecified	1	NA		
Nickel: Metal including alloys:				
Unwrought	4	4	--	All from Netherlands.
Semimanufactures	--	[4]6	--	Italy 3; Sweden 3
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$83	$59	--	All from West Germany.
Tin:				
Ore and concentrate	--	60	--	All from Netherlands.
Metal including alloys:				
Unwrought	10	55	--	All from West Germany.
Semimanufactures	2	NA		
Titanium: Oxides value, thousands	--	$1	--	Do.
Tungsten: Metal including alloys, all forms do.	--	$48	--	All from Italy.
Zinc:				
Oxides	83	240	--	Italy 160; Belgium-Luxembourg 80.
Metal including alloys:				
Unwrought	82	61	--	All from Yugoslavia.
Semimanufactures	85	NA		
Other:				
Ores and concentrates	182,077	839	--	Italy 779; Netherlands 60.
Oxides and hydroxides	--	8	--	All from West Germany.

See footnotes at end of table.

Table 3.—Albania: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	7	--	All from Italy.
Artificial: Corundum	4	NA		
Dust and powder of precious and semiprecious stones, including diamond value, thousands	--	$3	--	All from Austria
Grinding and polishing wheels and stones	75	93	--	Yugoslavia 81; Italy 9.
Asbestos, crude	2,602	2,718	--	Yugoslavia 2,568; Italy 150.
Boron materials: Oxides and acids	3	8	--	All from Yugoslavia.
Cement	20	27,855	--	Greece 27,853.
Clays and clay products:				
Crude:				
Bentonite	--	20	--	All from Yugoslavia.
Unspecified	211	328	--	France 313.
Products:				
Nonrefractory	53	296	--	All from Italy.
Refractory including nonclay brick	17,437	10,824	--	Yugoslavia 4,970; Hungary 3,167; Poland 1,943.
Feldspar, fluorspar, related materials: Unspecified	1,754	839	--	Italy 836.
Fertilizer materials: Manufactured:				
Nitrogenous	1	NA		
Potassic	1	625	--	Italy 600; West Germany 25.
Graphite, natural	--	70	--	All from West Germany.
Halogens: Unspecified	--	[5]2	--	All from Greece.
Lime	--	1	--	All from West Germany.
Magnesium compounds: Other	9	8	--	West Germany 7.
Mica: Worked including agglomerated splittings	--	1	--	All from West Germany.
Phosphates, crude	38,954	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	35	40	--	West Germany 37.
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$75	NA		
Salt and brine	4	NA		
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1	758	--	All from Italy.
Sodium carbonate, natural and manufactured	1	2	--	All from West Germany.
Sodium hydroxide	37	803	--	Italy 488; Yugoslavia 315.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	6	--	All from Italy.
Worked	25	35	--	Italy 34.
Quartz and quartzite	17	22	--	All from West Germany.
Sand other than metal-bearing	2,999	2,342	--	Yugoslavia 2,294; Sweden 26.
Sulfur: Sulfuric acid	3,624	20	--	All from West Germany.
Talc, steatite, soapstone, pyrophyllite	1,865	610	--	All from Yugoslavia.
Other: Crude	95	114	--	Yugoslavia 62; Greece 50.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	11	27	--	All from West Germany.
Coal: Anthracite and bituminous	159,358	186,995	82,860	West Germany 67,027; United Kingdom 37,108.
Coke and semicoke	14,585	9,480	--	All from United Kingdom.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	23	NA		
Gasoline do	6,945	6,256	--	Italy 6,248.
Mineral jelly and wax do	--	2,857	--	West Germany 2,558; Italy 275.
Distillate fuel oil do	--	60	--	All from Italy.
Lubricants do	24,269	33,936	--	Italy 20,979; Yugoslavia 12,635.
Residual fuel oil do	2,631	NA		

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Albania, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Excludes exports from Switzerland valued at $13,000.

[3]1981 imports were $9,000, of which $5,000 came from France and $4,000 from West Germany.

[4]Excludes exports from Switzerland valued at $14,000 and from West Germany valued at $12,000.

[5]Excludes exports from West Germany valued at $3,000 and from the Netherlands valued at $1,000.

COMMODITY REVIEW

METALS

Bauxite.—Although data on reserves and grade are not available as yet, Albania reported the addition of bauxite to its exports.

Chromite.—The chrome mine production plan was not met, but ferrochrome output at Albania's only plant, at Burrel, was reported to have increased by 40% in 1982. Reportedly, much of the increase of Albanian ferrochrome arriving on the world market was due to payment in chromite to foreign construction companies for work completed and not to direct sales. Foreign sales of chrome ore were reported to have dropped in recent years and dockside stockpiles were estimated to be about 300,000 tons. Expansion was reported at a number of chromite mines as well as completion of construction of the Kalimash chrome processing plant. The construction of four chromite mines was planned in the Mat, Kukës, and Tropojë districts in 1983.

Copper.—Albania's copper mining industry appeared to have improved its performance after the 1981 shortfall in planned production, although official silence regarding mining output for 1982 suggested that production may have been below the planned goal. The production of blister copper increased 12% in 1982 over that of 1981. Albania reported the completion of the Fushe-Arrez beneficiation plant as well as the start of production at two new copper mines near Kukës, in northern Albania. The plan for 1983 called for expansion of facilities at the Reps copper concentrator and the construction of a new concentrator at Rrëshen.

Iron Ore (Nickeliferous).—Albania's production capacity was about 1.2 million tons of iron ore per year at three mines. The domestic 700,000-ton-per-year iron and steel industry was unable to absorb all of the ore produced and approximately 400,000 tons was shipped to Czechoslovakia.

Iron and Steel.—Albania reported the completion of a new blast furnace, a second coke battery, and a new section of the continuous-casting unit at the Elbasan steelworks. The blast furnace was the second unit at Elbasan. Furnace No. 1 was also relined and restarted during the year. The new section of the casting unit included a newly installed wire drawing facility and extension of the bar-rod mill.

Nickel and Cobalt.—The decision to contract an electrolytic nickel and cobalt oxide unit was announced. The unit would be constructed by the West German Government-owned Salzgitter Industriebau AG; technology, engineering, laboratory services, and training would be provided by Inco Tech, a subsidiary of Inco Ltd. of Canada. The 5,400-ton-per-year project cost was estimated at between $21 million and $25 million and startup was expected by mid-1985. Most of Albania's nickel ore is shipped to the Czechoslovak nickel refinery at Sered, while domestically produced nickel carbonate was sold on the world market.

MINERAL FUELS

Albania's production of mineral fuels and electricity was sufficient for domestic needs and permitted small exports.

Coal.—Coal production rose by 9% in 1982. Reportedly, the mid-1982 production level surpassed the planned level by 10,700 tons. Albanian coal is consumed domestically by the country's powerplants and heavy industries and provides 30% of domestic energy needs.

Petroleum and Natural Gas.—Although gas production increased 17% over that of 1981, meeting the goal, the petroleum production plan was not met. Allegedly, the shortfall was due to faulty drilling techniques as well as dated technology. Consumption of petroleum and natural gas was over 60% of the total primary energy consumption. In 1982, an agreement was signed with Romania for the purchase of a lubricating oil plant from that country.

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[1]Foreign mineral specialist, Division of Foreign Data.

The Mineral Industry of Algeria

By Suzann C. Ambrosio[1]

Algeria's mineral industry contributed an estimated $14 billion to the 1982 estimated gross domestic product of $43 billion.[2] Less than 1% of the mineral industry's revenues was generated by nonfuel minerals. The nonfuel mineral industry's output, comprised primarily of iron, phosphate, and mercury, and to a lesser extent, steel, cement, fertilizer materials, lead, and zinc, was estimated to be valued at nearly $70 million. The past decade's development budget emphasis on heavy industry, including petroleum, natural gas, iron, and steel, has shifted toward light industry. Production expansion of liquefied gas products—liquefied natural gas (LNG) and liquefied petroleum gas (LPG)—iron, cement, and other value-added mineral products was expected over the near term.

Algeria was the largest African natural gas producer and third largest African oil producer during 1982. Algeria was estimated to have supplied 1.2% of total world crude petroleum output and 2.5% of total commercially marketable natural gas. Algeria ranked eighth in world natural gas production, and reserves represented 3.7% of the world's total resources. The Société pour la Recherche, la Production, le Transport, la Transformation, et la Commercialisation des Hydrocabures (SONATRACH) was projecting an approximate $1 billion increase in 1983 foreign-exchange income owing to revised natural gas contracts.

In line with the Government's decentralization policies, SONATRACH was restructured into four independent oil service companies: Entreprise Nationale des Traveaux aux Puits, Entreprise Nationale des Services aux Puits, Entreprise Nationale de Geophysique, and Entreprise Nationale de Forage. In addition to decentralizing major public enterprises, a new Investment Code was promulgated to stimulate private investment. The new code was based on the December 1982 session of the National Liberation Front central committee and would replace the 1966 Investment Code. The proposed code provided Government financial assistance for both existing private enterprise and promotion of new ventures. Credit availability was expected to be contingent on the project's relationship to priorities of the national development plan. The 1980-84 national investment program placed increased emphasis on agriculture, transport, and infrastructure developments.

Some infrastructure projects, especially railroad and electrification plans, made headway during 1982. Société Algerienne de Electricité et du Gaz, the state corporation for distribution of electricity and gas, planned to allocate $1.5 billion to extend electricity to about 75% of the townships by 1984. Primarily oil and diesel generating stations and electricity transmission lines have been contracted out to a variety of European and U.S. firms.

Algeria's 4,000-kilometer rail network was undergoing a major overhaul. The Transport Ministry estimated that rail freight capacity would increase from 11 to 25 million tons between 1980 and 1984. Of major significance to the mineral industries were ongoing feasibility studies for an east-west rail line from Tebessa to Sidi Bel Abbes and a major southern interior route from La Macta through Sidi Bel Abbes to Gara Djebilit, facilitating phosphate fertilizer and iron ore mining developments, respectively.

PRODUCTION AND TRADE

Algeria's mineral policies continued to focus on enhanced hydrocarbon production and exports, nonfuel mineral import substitution, and enhanced output of materials for domestic consumption. The most recent official trade statistics for 1979 indicated that the value of mineral exports was approximately $10 billion. The reported principal mineral exports were, in descending order of value, crude oil, natural gas, petroleum products, iron, phosphate, and mercury. The principal nonfuel mineral imports during the same period were valued at approximately $1.3 billion and included iron and steel materials and cement. More recent publications have reported that total hydrocarbon exports, including refined products, were valued at nearly $14 billion and accounted for nearly 98% of the nation's exports in 1981.[3] Small amounts of barite, fertilizer materials, base metals, and salt were also exported. Algeria continued to rely on a large variety of mineral imports consisting largely of zinc ore and concentrate, unwrought lead, semimanufactured copper, primary and secondary forms of iron and steel, nitrogenous and potassic fertilizers, other metals, coke, and semicoke.

Since nearly 60% of nonfuel mineral output was consumed locally, the Société Nationale de Recherches et d'Exploitations Minières planned to more than double virtually all mineral production, excluding mercury, between 1978 and 1985. Ambitious targets have been set, and industry reorganizations have been initiated, but the combination of depressed world markets, organizational changes, and the lack of investment capital had inhibited efforts by 1982 to reach the stated goals.

Despite rapidly increased domestic consumption of both oil and gas over the past 5 years, deliberately reduced oil production, and relatively stable or slightly increased natural gas and LNG production, Algeria continued to rely heavily on hydrocarbon revenues for foreign exchange. The average daily exports of crude declined 13.5% between 1979 and 1980 and 24% between 1980 and 1981. Although LNG capacity was increased and flexibility added in terms of product form and storage and transport facilities, actual sales have fallen short of expectations.

Algeria's major trading partners continued to be France, the Federal Republic of Germany, other European nations, and North America. Between 1977 and 1980, the European Economic Community countries' share of Algerian trade went from 58% to approximately 62% for imports and from 36% to 38% for exports. The U.S. share during the same period has increased from 6.5% to 7% for imports, primarily owing to increased hydrocarbon prices. During 1981, the U.S. imported Algerian crude and petroleum products valued at $5.8 billion and $580,000 worth of processed zinc. The U.S. exported iron, steel, zinc chemicals, aluminum, and other nonferrous materials valued at $44 million to Algeria over the same period.

Table 1.—Algeria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Antimony (content of ores and concentrates)	60	60	--	NA	NA
Cadmium, refined	r34	r64	60	65	65
Copper concentrate:					
Gross weight	679	870	1,048	1,090	900
Metal content	157	200	240	250	200
Iron and steel:					
Iron ore, gross weight thousand tons	r3,051	r2,864	3,454	3,406	3,900
Metal:					
Pig iron do	480	396	400	430	450
Steel, crude do	417	416	534	550	575
Lead concentrate:					
Gross weight	2,837	3,594	2,800	5,600	5,600
Metal content	r1,500	r2,200	1,800	3,600	3,600
Mercury 76-pound flasks	r30,592	r14,719	24,403	25,000	20,000
Silver[e] thousand troy ounces	75	100	100	110	110

See footnotes at end of table.

Table 1.—Algeria: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Zinc:					
Concentrate:					
Gross weight	9,981	10,210	17,100	12,900	12,900
Metal content	4,790	4,900	8,200	10,800	10,800
Metal, smelter	25,700	27,300	30,000	31,000	31,000
NONMETALS					
Barite, crude	[r]74,021	[r]102,513	98,255	[e]99,000	100,000
Cement, hydraulic thousand tons	2,697	3,768	4,156	4,460	5,500
Clays:					
Bentonite	35,664	[e]36,500	36,500	[e]38,000	38,000
Fuller's earth	4,847	[e]5,000	[e]5,000	[e]5,100	5,100
Kaolin	17,423	[r]9,500	[e]18,000	[e]19,000	15,000
Diatomite	4,025	4,400	4,400	[e]4,500	4,500
Gypsum and plaster[e 3] thousand tons	175	191	200	200	200
Lime, hydraulic do.	50	82	90	90	90
Phosphate rock do.	1,136	1,084	1,025	[e]1,250	1,300
Salt do.	171	[r]162	154	187	170
Sodium compounds: Caustic soda[e]	700	700	700	700	700
Strontium minerals: Celestite, gross weight	5,822	[e]5,400	[e]5,400	[e]5,400	5,400
Sulfur, elemental[e]	15,000	15,000	14,000	15,000	10,000
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	1,148,322	1,539,006	1,497,511	1,613,873	1,700,000
Marketed (including liquefied) do.	490,095	[r]516,023	411,414	466,151	470,000
Natural gas plant liquids (condensate)[e] thousand 42-gallon barrels	32,200	33,872	34,000	68,000	70,000
Petroleum and refinery products:					
Crude do.	423,838	421,121	361,599	294,850	250,000
Refinery products:					
Gasoline do.	10,914	11,315	9,516	NA	NA
Jet fuel and kerosine do.	4,453	4,380	3,294	NA	NA
Distillate fuel oil do.	15,732	16,790	26,352	NA	NA
Residual fuel oil do.	12,447	12,775	18	NA	NA
Lubricants do.	362	365	732	NA	NA
Other do.	7,594	10,220	21,594	NA	NA
Refinery fuel and losses do.	5,365	2,555	3,294	NA	NA
Total do.	56,867	58,400	64,800	[e]120,000	150,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through July 1, 1983.

[2]In addition to the commodities listed, secondary aluminum, secondary lead, and secondary copper may be produced in small quantities; ammonia is produced; and crude construction materials, additional to those listed, presumably are produced for local consumption, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Includes approximately 50,000 tons of plaster each year.

COMMODITY REVIEW

METALS

Iron Ore.—Mining of iron ore deposits began in 1865 in the Beni-Saf region. Approximately 16 deposits have been worked, and about 6 deposits of the adjacent Ouenza and Bou Khadra areas are currently being mined. To date, the primary ores, siderite and hematite, were being mined, with an iron content of 50% to 64%. Reserves of these replacement deposits of Jurassic, Cretaceous, and Eocene Age were estimated at 120 million tons. If the larger and more recently discovered Gara Djebilit, sedimentary magnetite, deposits are included, the total ore reserves would increase to 820 million tons.

Development of the Gara Djebilit and Mercheri Abudul Aziz deposits in southwestern Algeria will require large infrastructure expenditures. Construction of a railroad from Gara Djebilit near Tindouf to a point near Oran on the Mediterranean coast was being considered as part of the long-term development scenario. The Soviet Union has recently signed an $8 million contract to provide technical mining assistance at Gara Djebilit.

Iron and Steel.—A 2-million-ton-per-year iron and steel complex, originally to be located at Jijel, was expected to meet Algeria's iron and semisteel product needs. The Société Nationale de Siderurgie (SNS) decided to relocate the plantsite from the

coastal town of Jijel to an inland, mountainous site at El Milia. Plant construction, already 3 years behind schedule, was pushed ahead to 1987. Infrastructure requirements and design changes, involving the replacement of the blooming mill with a continuous caster, were expected to add to the project's delay.

The original annual capacity plans included a 3.2-million-ton iron pelletizing plant, a 2.3-million-ton direct reduction plant, eight 150-ton electric arc furnaces, and a 2-million-ton blooming and billet mill.

SNS was considering annual purchases of 2 million tons of Mauritania's Guelbs iron ore to feed the nation's recently expanded 500,000-ton steelmaking capacity. Since steelmaking capacity was expanded and was expected to increase further as El Milia comes onstream, the demand for iron ore will likely exceed domestic production until Gara Djebilit is developed.

Other Metals.—Compagnie Algerian de Zinc continued to produce small amounts of lead and zinc from the El Abed Mine and, to a lesser extent, from the Bou Caid and Ain Barbar Mines. Zinc was smelted at Ghazaout, Algeria, and Oued El Heimer, Morocco.

NONMETALS

Cement.—Cement output increased 23% over that of 1981, to 5.5 million tons. The shortfall of approximately 3 million tons was imported from Europe. An ambitious domestic annual production target of 12 million tons was set for 1984.

F. L. Smidth (France) continued to work on a 1-million-ton-per-year plant at Sour El Ghozlane, 140 kilometers southeast of Algiers. Cimenteries of Belgium was the consulting engineering company for the delayed project. Startup was expected by yearend 1983.

Fertilizer Materials.—*Nitrogenous.*—SONATRACH's refurbished 272,000-ton-per-year ammonia plant at Arzew was back onstream during 1982, but the new 121,000-ton-per-year urea unit was not yet operational by yearend. Although there is no domestic market for urea, the plant's output was expected to be exported to Western Europe.

The proposed 272,000-ton-per-year Skikda ammonia plant remained in the early planning stages. Construction and commissioning of the Annaba fertilizer complex, which was expected to boost output of sulfuric acid and nitrogen and phosphate fertilizers by 1982, were apparently shelved. Technical difficulties reported during 1981 and the lack of any progress during 1982 in combination with SONATRACH's efforts to improve efficiencies at operating plants suggest that the facility was temporarily canceled.

Phosphate.—Algeria's phosphate deposits located at Djebel Onk, Kouif, and Mzaita contain estimated resources of nearly 500 million tons. The largest operating mine at Djebel Onk had an annual capacity of 2.4 million tons of 63% to 65% bone phosphate lime (BPL) concentrates. When upgraded, the mine could yield 0.5 million tons of 75% to 77% BPL products. Current beneficiation and calcination raises the BPl grade to 69.5%.

Output was expected to continue to increase at Djebel Onk, and the proposed Annaba and Tebessa facilities continued to be delayed. The Tebessa fertilizer complex would increase annual output of phosphoric acid by 165,000 tons by 1983. In general, the lack of water, other environmental concerns, and the scale of the proposed facility still needed to be resolved.

MINERAL FUELS

Petroleum and Natural Gas.—Approximately 75 oil and gas fields, located in 5 geologic regions, have produced hydrocarbons since discovery of the first field in 1910. Of the five productive geological areas, the Central Triassic Basin and the Illizi Basin continue to be the most important oil-producing areas. The three major producing fields, Hassi Messaoud, Hassi R'Mel, and Edjelah, are located within these two basins. The first two major fields roughly split the nation's natural gas reserves between them. The major gas condensate fields are located in the Central and Ahnet Basins, south of the major oilfields and north of the Hoggar Mountains, in central Algeria.

Algeria's proven and probable natural gas reserves, larger on a world scale than their crude petroleum reserves, were estimated at nearly 170 trillion cubic feet during 1982. Proved and probable reserves of crude oil were estimated at 12.4 billion barrels from known deposits. The average petroleum recovery factor of 1980 operations was nearly 40%. At least three of the major oil and gas fields in Algeria were undergoing water and/or gas injection operations. Hassi Messaoud was undergoing water and gas injection, and the two other fields, Rhourde-Nouss and Zarzaitine, were undergoing gas injection to improve recovery rates.

Total 1981 installed refinery capacity was 521,000 barrels per day. The facilities were, in descending order of percentage of total 1981 capacity, Skikda, 67.9%; Arzew, 13.4%; Algiers, 11.9%; Hassi Messaoud, 5.4%; and InAmenas, 1.4%. LPG was produced at the Algiers refinery and from associated gas at the Hassi Messaoud and Hassi R'Mel Fields, and LNG was produced at the Arzew and Skikda refineries. The LPG was transported from the oil and gas fields via condensate and two LPG lines to the port of Arzew. The nearly completed Bethioua LPG facility, located near Arzew, was expected to boost LPG export capacity in two stages during 1983-84. Enhanced LPG output was favored over LNG because of cheaper rates associated with gas pipelines when compared to LNG tankers. Once the trans-Mediterranean pipeline from Algeria to Italy is fully operational, natural gas exports were initially expected to reach 1.5 trillion cubic feet per year, with approximately 70% in the form of LNG and 30% as LPG.

Algeria's production strategy was discussed in a SONATRACH paper presented at the October 1982 Gastech Symposium in Paris. A 50% lowered production target of approximately 70 million barrels of LPG was set for 1985. The LPG was to be split into propane and butane in two separation units, the second of which was expected to go onstream during 1983. The completion of the first development phase was expected by 1984, when annual capacity of about 60 million barrels was reached. Tentative plans were made to expand annual LPG production to 80 million barrels.

Sources of LPG extraction included four liquefaction plants in Arzew and Skikda and three refineries at Arzew, Algiers, and Skikda. Exports can be lifted from two major harbors at Arzew and Bethioua. The new Bethioua port can handle the largest ships, from 2.6 to 4.8 million cubic feet.

Various engineering and construction contracts were awarded to facilitate expanded output of LPG and condensate. A $500 million contract was awarded to an unnamed European company to develop plans for a 50-million-barrel-per-year LPG plant at Arzew. In addition, Canadian Bechtel Ltd. was contracted to construct both a 900-million-gallon-per-year condensate facility and a 270,000-gallon-per-year LPG facility at the Rhourde-Nouss Oilfield.

Algeria's natural gas contracts, negotiated with several European countries and the United States, were successful in (1) modifying the gas price upward, (2) linking the gas price index to crude prices, and (3) periodically revising contract clauses to adjust the price of gas and guarantee its purchasing power.

In February 1982, agreement was reached between Algeria and France to link the two previously existing contracts and a new one into a single deal. The total amount of the contract was for the annual supply of 321 billion cubic feet per year over 20 years, at $5.10 per million British thermal units (Btu) of gas. In addition, the French agreed to pay another $0.70 per million Btu for transport, insurance, and regasification. However, Gaz de France was expected to pay only $4.60 per million Btu, with the French Treasury paying the difference. Similar to the agreement made in 1981 with Belgium's Distrigaz, gas prices were indexed 50% to increases in the average official price of crudes imported by the French and 50% to crudes exported by the Organization of Petroleum Exporting Countries gas exporters. The Algerian-Gaz de France $4.60 per million Btu price was reported to be marginally less, by $0.05 per million Btu, than the price France agreed to pay for the Soviet Union's natural gas.

Algeria and Italy made a partial agreement during September 1982 to purchase approximately 425 billion cubic feet per year for 25 years. The gas would be transported via the Transmed pipeline at a price of $4.41 per million Btu, f.o.b. Algerian-Tunisian border. This price was approximately $0.40 per million Btu more than the price of Soviet gas. Italy's state oil group, Ente Nazionale Idrocarburi (ENI), was not satisfied with the September agreement when they calculated the international gas price to be $3.62 per million Btu during October. The Italian Government was seriously considering a decree-law that would authorize a rebate payment to ENI of up to $0.50 per million Btu.

Algerian gas contracts were handled by individual companies in the United States, and they were for the most part inconclusive by yearend. SONATRACH's negotiations with Trunkline LNG Co., in Lake Charles, La., stem from a contract signed in 1975 for the delivery of 165 billion cubic feet per year of gas for 20 years. Deliveries were delayed until October 1982 after Trunkline altered the purchase contract. At that date, Trunkline's LNG price was $3.92 per million Btu, f.o.b. Algeria, subject to semiannual adjustments based on No. 2 and No. 6 fuel oil price index delivered to New York. The Federal Energy Regulatory Commission

granted temporary tariff approval to the imports, but the required additional approval by the U.S. Economic Regulatory Administration (ERA) was not granted by yearend.

Negotiations were still being held between SONATRACH and other U.S. customers, including El Paso Natural Gas Co. and Distrigas of Boston. In a statement filed with ERA, Distrigas proposed an amendment to the original 1976, 20-year supply contract that would increase the base c.i.f. delivered price from $4.95 to $5.47 per million Btu. The LNG was indexed to a basket of six crudes and was expected to change with the world price of the average calorific equivalent of these crudes.

Strong opposition to the tentative U.S. gas supply agreements was expressed by a group of gas distributors, consumers, and a number of Congressional representatives. Trunkline, a subsidiary of Panhandle Eastern Corp., was planning to sell the expensive regasified LNG at $7.18 per million Btu to gas pipeline affiliates, which will in turn distribute the gas to Michigan, Illinois, and Indiana customers. State industry and Congressional representatives were requesting ERA to suspend or revoke Trunkline's 1977 import authorization.

Pipelines.—Algeria's largest 1,070-kilometer, 48-inch Transmed pipeline was still not fully commissioned by yearend 1982 contrary to SONATRACH's sales forecasts. Bechtel Ltd. (United States) was constructing both a 510-kilometer, 24-inch and an 11-kilometer, 14-inch LPG line from Hassi R'Mel to Arzew. Saipem, a subsidiary of ENI, was constructing a 525-kilometer, 30-inch crude line from Ohanet to Haoud El Hamra. Both construction projects were projected to be completed during 1983. Algeria was also considering the construction of a fourth gas pipeline from Tiaret, Hassi R'Mel, to the Arzew port to increase natural gas supplies to LNG-1 and LNG-2.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Algerian dinars (DA) to U.S. dollars at the rate of DA4.5922=US$1.00.

[3]International Monetary Fund. International Financial Statistics. May 1983, pp. 64-65.

The Mineral Industry of Angola

By George A. Morgan[1]

Activity in the mining sector remained relatively unchanged in 1982, compared with that of 1981. Goals for production of various mineral commodities were adjusted downward or left at existing levels because of low labor productivity, reduced Government expenditures, and an inefficient transportation sector. Development was also constrained owing to insecurity in a large portion of the country and the unavailability of skilled labor. Basic infrastructure projects such as dam rebuilding were the main areas of planned activity.

Expenditures in the mining, transportation, and industrial sectors were dependent to a large extent on revenues derived from the export of crude oil. However, declining world oil prices resulted in a drop in export receipts of $350 million.[2] Defense costs were reported to be consuming a significant portion of the total budget. By yearend, the Government planned to seek external financing to balance the budget and to continue with major planned investments in the oil and gas sector.

Government Policies and Programs.—Action was taken by the Government to counter the loss of a large portion of export revenues owing to declining oil prices. Production goals were reduced for a number of plants. In addition, a cutback in the granting of import licenses was instituted.

Information regarding a number of organizational changes instituted in the past few years has since become available.[3] A National Directorate of Geology and Mining was created within the Ministry of Industry and was responsible for the mining industry. The National Institute of Geology was also within the Directorate, but was expected to become financially and administratively independent. Separate state companies have been set up for specific mineral commodities and were under the direct control of the National Directorate of Geology and Mining. Empresa Nacional de Diamantes de Angola (ENDIAMA) was created in 1981 and was responsible for prospecting, exploitation, processing, and marketing of diamonds. ENDIAMA represents the state's share in Companhia de Diamantes de Angola. Production goals for diamond and other mineral commodities were set by the Popular Movement for the Liberation of Angola. Empresa Nacional de Ferro was responsible for the exploitation, processing, and marketing of iron and manganese. Empresa Nacional de Rochas Ornamentais was created to oversee activities in the quarrying of granite, marble, and other industrial rocks. Empresa Mineira de Quartzo has control of quartz output. Empresa Mineira de Fosfatos do Zaire has control of exploration and development of phosphate.

PRODUCTION AND TRADE

Information regarding production and trade of mineral commodities continued to be unavailable. Despite the lack of official data, estimates have been provided that reflect the general level of possible mineral output.

Reinjection of natural gas into declining oilfields and other technical changes were affected in 1982, but did not stop the decline in oil output, which was down for the second straight year. Conditions for maintaining efficient operations at the diamond-pro-

ducing areas in the northeast of the country deteriorated further; the production goal was not met, and actual output was estimated to be unchanged from that of 1981.

Crude oil, diamonds, and cement were estimated to be the only mineral commodities exported. The Port of Luanda was reported to be heavily congested, mainly from the unloading of foodstuffs. Much of the material deteriorated owing to excessive delays.

Table 1.—Angola: Production of mineral commodities[1]

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Iron and steel: Crude steel[e] ____ metric tons	10,000	10,000	10,000	10,000	10,000
NONMETALS					
Cement, hydraulic ____ thousand metric tons	400	[e]400	240	[e]250	300
Diamond:					
Gem ____ thousand carats	525	630	1,125	1,100	1,000
Industrial ____ do.	175	210	360	300	400
Total ____ do.	700	840	1,485	1,400	1,400
Gypsum[e] ____ metric tons	25,000	25,000	25,000	20,000	20,000
Salt[e] ____ do.	50,000	50,000	50,000	50,000	50,000
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural[e] ____ do.	25,000	25,000	25,000	25,000	25,000
Gas, natural:[e]					
Gross ____ million cubic feet	46,500	48,600	58,000	55,000	52,000
Marketable ____ do.	2,500	2,500	2,500	2,500	2,500
Petroleum and refinery products:					
Crude ____ thousand 42-gallon barrels	47,450	49,640	55,034	[e]52,000	50,700
Refinery products:					
Gasoline ____ do.	510	[e]500			
Jet fuel ____ do.	480	[e]450			
Kerosine ____ do.	160	[e]160			
Distillate fuel oil ____ do.	1,567	[e]1,500	NA	NA	NA
Residual fuel oil ____ do.	3,796	[e]3,700			
Other ____ do.	189	[e]150			
Refinery fuel and losses ____ do.	368	[e]300			
Total ____ do.	7,070	[e]6,760	NA	NA	NA

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through July 20, 1983.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and broken stone) presumably is produced for local consumption, but information is inadequate to make reliable estimates of output levels.

COMMODITY REVIEW

METALS

Iron Ore.—Austromineral, a subsidiary of Voest-Alpine, sought to obtain both management and marketing rights for iron concentrates produced at Cassinga. Cassinga was located on a railroad line about 520 kilometers from the loading pier at Moçâmedes. Iron ore at Cassinga was classified as a detrital ore derived from banded ironstones in a late Cambrian volcanic series. Although several hundred million tons of currently unminable itabirite type ore was known at Cassinga, proven recoverable detrital ore at Cassinga North (Jamba) area was 21.7 million tons, minable by scrapers.

Iron and Steel.—Siderurgia Nacional operated the country's sole iron and steel plant at Luanda, which had a designed production capacity of 30,000 tons per year of raw steel and 50,000 tons per year of rolled products. However, output was only about one-third of capacity. Voest-Alpine AG of Austria was to reequip and update the plant at a cost of $18 million. Contract specifications reportedly included a new plant, spare parts, and 20 specialists for technical assistance over a period of 36 months. The technicians were to restart steelmaking and rolling operations, and raise output to 30,000 tons per year of billets. Iron and steel scrap recycling centers were also planned.

NONMETALS

Cement.—The cement plant of Empresa

de Cimentos de Angola in Luanda lost an unspecified amount of capacity owing to the breakdown of one of its furnaces. Cia. de Cimento Secil do Ultramar S.A.R.L. continued to refurbish the Luanda plant and to improve shiploading facilities. The project included equipment replacement, technical assistance, and personnel training.

Diamond.—About 40 sites were operated in the Luanda district of northeast Angola for the production of diamond. Output continued to be adversely affected by operational inefficiencies and poor security. Planned output levels were not met. About 5 million cubic meters of ore was treated in 1981, the latest year available. Sales receipts were reported to total $200 million. Attempts continued to be made to limit trade in illegal diamonds.

Phosphate Rock.—Over $600,000 was provided by the United Nations for the development of phosphate rock deposits in Angola. Prospecting continued in the Cabinda Enclave, where numerous occurrences were reported.

MINERAL FUELS

Natural Gas.—The Government had a general policy of prohibiting the flaring of natural gas. Excluding gas in the Cabinda Enclave that was flared owing to its hydrogen sulfide content, all gas produced must be utilized. Associated gas from Texaco Petroleos de Angola's concession in block 2 may be used in an ammonia-urea plant. Estimated consumption would be about 50 million cubic feet per day. Cost for the project was estimated at between $400 million and $600 million. In addition to the associated gas in block 2, the Etele Field, discovered in 1975, was mainly nonassociated gas and had reserves that may total over 2 trillion cubic feet. It has been considered as a backup for the ammonia-urea plant.

Petroleum.—Exploration, production, and processing of oil and gas in Angola were controlled by the Government-owned Sociedade Nacional de Combustiveis de Angola (SONANGOL). Following the results of seismic surveys completed in 1979, 13 exploration blocks were defined offshore Angola. Included in these blocks were concessions already in operation in the Cabinda Enclave and the Kwanza River Basin.[4]

Output in 1982 was about 139,000 barrels per day from four producing areas; two offshore and two onshore. About 85,000 barrels per day was from the offshore fields of Cabinda Gulf Oil Co., and 15,000 barrels per day was from Texaco Petroleos de Angola's offshore concession in block 2. The Congo Basin supplied 34,000 barrels per day and the Kwanza Basin 5,000 barrels per day, both from onshore wells.

An enhanced oil recovery program was instituted in the Cabinda Enclave, and the completely new Takula Oilfield began development for commercial oil production. The enhanced oil recovery program was based on a gas reinjection plan, which was funded at a cost of $200 million by the Import-Export Bank, the Italian Export Credit Agency, and commercial banks in the United States, Europe, and Saudi Arabia. Using both associated and nonassociated gas, the program was to increase oil output by 10,000 barrels per day. The Takula Field, with reserves of 120 million barrels of oil, was to add 70,000 barrels of oil output per day at a capital cost of $600 million. Sweet gas from wellhead separators as well as nonassociated gas was utilized in the injection process. Gas with hydrogen sulfide content was flared. Liquid gasoline was blended into the crude oil stream, while propane and butane were delivered to an offshore storage tanker.

Oil from the onshore fields in the Congo Basin was shipped to the Luanda refinery and to overseas refineries via the Quinfuguena terminal. An offshore extension into deeper water allowed 250,000-ton-deadweight vessels to berth. Output from the Kwanza Basin was from 52 wells, nearly all of which required water injection or gas lift. Output from Quenguela Norte, which was 75% of the total produced, was shipped directly to the Luanda refinery.

Société National Elf Aquitaine's drilling effort in block 3 resulted in five discoveries from six wildcat wells since commencing exploration in 1981. Two were commercial and were being prepared for development. A development plan was submitted to SONANGOL for a $350 million project to produce 30,000 barrels per day. An offshore tanker-loading system was to be used. Another development plan was being readied by Elf Aquitaine for the Pacasso 2 Field, which would add an additional 30,000 barrels of oil output per day.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been estimated to be convertible from Angolan kwanza to U.S. dollars at the rate of 31.25 kwanza = US$1.00 for 1981 and 30.214 kwanza = US$1.00 for 1982.

[3]Mining Magazine (London). The Reorganization of Mining in Angola. V. 148, No. 4, April 1983, p. 298.

[4]Oil & Gas Journal. Angola Paces W. Africa in Expanding Oil Flow. V. 81, No. 10, Mar. 7, 1983, p. 67.

The Mineral Industry of Argentina

By Pablo Velasco[1]

The economy of Argentina, depressed for 3 years, showed signs of recovery at yearend. However, the economy was impacted by world recession during the year and reflected a decline in the gross domestic product (GDP), high interest rates, and inflation.

The overall GDP in 1982 declined 5.7% to an estimated $66.5 billion[2] at current official prices compared with that of 1981, according to estimates released by the Argentine Central Bank. The inflation rates were 210% (consumer price index) and 311% (wholesale price index). According to the Central Bank, Argentina's total external debt at yearend was $38.7 billion, including arrears of $2.8 billion. Preliminary figures indicated that the merchandise trade surplus was $2.25 billion, owing, not to a good export performance, but to a 43% decline in imports. The mineral industry of Argentina, including mineral fuels (petroleum, natural gas, and coal), fell by 0.9% of GDP compared with that of 1981.

Petroleum and gas exhibited a 1.8% growth of GDP compared with that of 1981, as a result of larger distribution facilities with inauguration of the Western Central Gas Pipeline and greater consumption because of the substitution of fuel oil for natural gas. Petroleum production declined 1.4% owing to the long-lasting renegotiation agreements with the Yacimientos Petrolíferos Fiscales (YPF) contractors. The value of metallic minerals declined to 9.7% of GDP compared with that of 1981, owing to a decrease in production of tin and silver as well as lead and iron ore. A severe drop in domestic demand of industrial materials, mainly for the construction industry, resulted in a 17.8% decline of GDP in nonmetallic minerals output compared with that of 1981.

Major plans for investment in a number of projects were announced during the year. Housing projects were given priority because of their social impact and the need to stimulate the construction industry. The Piedra del Aguila hydroelectric project (1,400 megawatts) was among projects announced. The Inter-American Development Bank (IDB) has already committed $400 million for this project.

The huge Yacyretá-Apipé hydroelectric complex (2,700 megawatts), a joint Argentine-Paraguayan project, will resume construction in the second half of 1983, after a lengthy delay. The International Bank for Reconstruction and Development (World Bank) and IDB have each made a loan of $210 million for the engineering.

Argentina is fortunate in having an excess of natural gas and enough petroleum to be self-sufficient. The Government's policy is to build additional gas pipelines, encourage the use of natural gas by industry, and increase petroleum production by upgrading gas and petroleum processing plants. One large project that was started in 1982 was the conversion of the refineries in La Plata and Luján de Cuyo Provinces to produce lighter grades of refined petroleum products. This $300 million project is being partly financed by a World Bank loan of $200 million.

Exports of minerals, metallics, and nonmetallics, as well as mineral products in 1982 increased 56% and decreased 14% in volume and value, respectively, compared with those of 1981.

The aluminum industry output increased 2% compared with that of 1981. Domestic demand comes mainly from the energy sector (23%) and from the construction

industry (21%), which rose 46% compared with that of 1981.

Because of the declining international prices for aluminum and other export difficulties, exports fell 22% compared with those of 1981. Production of steel increased 15% to 2.9 million tons. Coal consumption was estimated at 900,000 tons, of which 730,000 tons was imported. About 3.2 million tons of iron ore was consumed in 1982, of which 50,000 tons was extracted from the Altos Hornos Zapla Mines in Jujuy and Salta Provinces and 630,000 tons was obtained from the Hierro Patagónico S.A. Minera (HIPASAM) pelletizing plant in Río Negro Province. The remaining 2.5 million tons was imported, mainly from Brazil.

Budget cuts and other factors have led to substantial delays in key projects of the Comisión Nacional de Energía Atómica (CNEA) nuclear power program. The uranium processing plant at Los Gigantes, Córdoba, came onstream at the end of 1982. The country's second nuclear powerplant, at Embalse Río III, Córdoba, was scheduled to come onstream in February 1983. The Arroyito heavy water plant in Neuquén Province, originally scheduled for completion in 1979, has been further delayed owing to budgetary and technical administrative problems. Present plans call for completion by 1984, with a total investment of $300 million. The Sierra Pintada uranium deposit development and processing plant installation was awarded to a French consortium for $150 million.

The Nevados del Famatina molybdenum-copper deposit in La Rioja Province, scheduled for developmental bidding proposals on July 30, 1982, was suspended until further notice by the Argentine Government Resolution No. 54/82. Instead, the Bajo la Alumbrera copper-gold deposit in Catamarca will be opened for bidding in 1983.

Government Policies and Programs.—Government actions related principally to the country's foreign debt, which by the end of 1982 totaled $38.7 billion, and negotiations with the International Monetary Fund (IMF) for $4.75 billion in standby credits. In the mineral area, Decree 836/82, published toward yearend 1982, authorized renegotiation of petroleum contracts with private interests. The Government, by offering tariff incentives in 1982, hoped to promote use of natural gas.

An international symposium for foreign companies and banks interested in investing in Argentine mining projects took place in April 1982 in Buenos Aires. This symposium was sponsored by Government organizations. Discussions were centered on five subjects: legal and tax regulations, large mineral deposits, exploration and/or exploitation tenders, role of national private enterprises, and financing of large-scale mining projects.

PRODUCTION

Preliminary statistics indicated that production of nonfuel minerals decreased 8% in 1982 from the 1981 level. The largest decrease in output took place in metallic ores (22%) while the output of nonmetallic ores decreased by 14%. Among nonmetals, there were increases in asbestos, barite, bentonite, kaolin, feldspar, fluorspar, and talc and decreases in cement, diatomite, gypsum, and salt.

Production of copper, gold, and zinc increased, and the output of iron ore, lead, manganese, silver, and tin decreased. Production of coal increased 3.4% in 1982. Petroleum output fell 1.4% owing to decreased activity by the contractors awaiting contract renegotiation. Natural gas output was up 13%, continuing the upward trend of the decade. Production of uranium concentrate (yellow cake) increased 61% as new concentration capacity came onstream at Los Gigantes, 60 kilometers west of Córdoba.

Table 1.—Argentina: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Primary	r49,400	r118,400	133,100	137,603	140,473
Secondary[e]	8,000	r9,000	7,000	5,500	5,300
Beryllium: Beryl concentrate:					
Gross weight	22	12	31	7	9
BeO content	2	1	3	1	1
Bismuth kilograms	300	--	NA	NA	NA
Cadmium, smelter	22	36	18	(3)	NA
Chromium: Chromite, gross weight	--	165	169	150	140
Columbium and tantalum concentrates, gross weight: Columbite kilograms	--	1,918	(3)	(3)	NA
Copper, mine output, metal content	319	89	182	76	4109
Gold, mine output, metal content troy ounces	5,600	10,140	10,622	14,757	415,272
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	909	611	437	398	320
Metal:					
Pig iron and sponge iron do	1,825	1,938	1,793	1,736	1,940
Ferroalloys, electric-furnace:					
Ferromanganese	r25,149	r34,373	23,234	22,423	423,546
Ferrosilicomanganese	10,281	r15,271	11,835	12,779	415,679
Ferrosilicon	10,343	r13,915	11,781	10,286	49,572
Other	r578	r2,327	2,226	2,771	49,676
Total	46,351	r65,886	49,076	48,259	458,473
Steel, crude thousand tons	2,786	3,203	2,702	2,527	42,897
Semimanufactures[5] do	2,566	3,010	2,643	2,193	42,545
Lead:					
Mine output, metal content	30,253	31,775	32,606	34,766	429,684
Metal:					
Smelter, primary[e]	r19,700	r2,000	23,200	19,000	37,000
Refined:					
Primary	19,700	32,000	23,200	19,000	17,000
Secondary	10,000	r18,000	18,500	15,600	15,000
Total	29,700	r50,000	41,700	34,600	32,000
Manganese ore and concentrate, gross weight	18,497	10,190	6,146	2,706	1,800
Silver, mine output, metal content thousand troy ounces	2,164	2,209	2,305	2,508	2,200
Tin:					
Mine output, metal content	362	386	351	462	340
Metal, smelter[e]	100	100	300	600	500
Tungsten, mine output, W content	r122	r74	44	12	10
Uranium, mine output, U_3O_8 content kilograms	168,832	877,930	284,900	202,310	326,040
Zinc:					
Mine output, metal content	36,585	37,509	33,409	35,427	36,662
Mine, smelter, primary	23,900	36,700	25,400	25,900	30,000
NONMETALS					
Abrasives: Garnet	NA	3	7,200	(3)	NA
Asbestos	1,069	1,371	1,261	1,280	1,340
Barite	45,685	54,928	49,623	49,279	452,393
Boron materials, crude	127,187	132,655	155,849	125,617	4138,143
Cement, hydraulic thousand tons	6,316	6,667	7,133	6,651	45,614
Clays:					
Ball clay (plastic clay), n.e.s do	2,441	2,198	1,953	1,681	41,372
Bentonite	106,957	157,382	131,384	122,719	4124,662
Foundry earth	--	41,082	44,871	41,799	442,649
Fuller's earth (decolorizing clay)	3,482	5,445	4,772	5,246	45,419
Kaolin	45,940	132,107	91,417	66,821	476,509
Laterite (aluminous)	43,410	68,580	73,110	86,853	75,000
Refractory	88,030	132,399	176,682	105,741	4129,385
Other[6]	435,481	577,226	693,950	407,014	417,560
Diatomite	7,227	7,321	6,527	4,972	4,500
Feldspar	41,824	33,550	32,529	26,118	427,891
Fluorspar	26,746	38,076	15,468	20,755	422,510
Graphite	8	10	5	2	412
Gypsum, crude	611,158	587,432	932,149	670,544	610,120
Lithium, spodumene, amblygonite, gross weight	803	106	80	25	30
Mica:					
Sheet	356	360	218	44	45
Waste and scrap	2,276	1,140	616	459	4509
Nitrogen: N content of ammonia	47,200	60,576	65,355	40,300	63,100
Phosphates: Thomas slag[7]	e3,080	6,676	3,621	673	600
Pigments, mineral, natural: Ocher	484	874	955	739	4809
Precious and semiprecious stones: Amethyst kilograms	307	8,000	1,000	1,500	1,000

See footnotes at end of table.

Table 1.—Argentina: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]		1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued						
Pumice and related volcanic materials		21,544	46,324	36,509	51,161	40,000
Salt:						
Rock	thousand tons	1	1	1	1	1
Solar	do	699	619	1,003	937	900
Total	do	700	620	1,004	938	901
Sand and gravel:						
Sand:						
Construction	do	14,773	15,348	17,017	15,273	[4]13,324
Ferruginous-titaniferous	do	307	410	1,630	3,100	1,000
Silica sand (glass sand)	do	313	329	202	265	[4]277
Gravel	do	11,320	11,796	10,657	9,522	[4]8,922
Stone:						
Alabaster		50	--	--	--	NA
Basalt	thousand tons	3,549	3,277	3,721	3,762	[4]3,855
Calcareous:						
Calcite, nonoptical		8,887	12,376	17,888	13,920	[4]15,242
Calcium carbonate (chalk)		7,419	13,174	32,706	4,673	6,350
Dolomite		184,800	289,940	220,521	212,928	[4]201,305
Limestone	thousand tons	15,956	15,238	14,322	14,491	14,500
Marble:						
Aragonite, broken		12,444	10,902	7,342	3,689	3,510
Onyx, in blocks and broken		22,149	22,919	23,638	15,911	[4]17,534
Travertine, in blocks and broken		6,020	13,239	16,297	12,144	[4]10,435
Unspecified, in blocks and broken		60,271	108,857	105,415	82,379	[4]79,492
Flagstone		67,258	113,182	161,219	73,243	[4]80,318
Granite:						
In blocks		28,991	38,646	41,005	46,812	47,100
Crushed	thousand tons	5,588	7,310	7,837	6,235	[4]6,219
Quartz, crushed		81,794	96,393	76,692	180,091	181,000
Quartzite, crushed	thousand tons	1,903	1,594	1,675	1,183	[4]992
Rhodochrosite		42	73	87	30	35
Sandstone		[r]67,257	89,388	187	160	180
Serpentine, crushed		32,359	32,376	30,248	28,467	28,680
Shell, marl		671,427	663,472	671,336	800,728	[4]823,592
Tuff, tufa	thousand tons	1,707	2,646	1,974	3,118	2,910
Strontium minerals: Celestite		1,195	122	268	310	[4]325
Sulfates, natural:						
Aluminum (alum)		44,425	48,454	34,735	4,186	5,200
Iron (melanterite)		--	10	100	NA	NA
Magnesium (epsomite)		7,801	11,909	8,556	1,000	1,500
Potassium (kalinite)		250	300	NA	NA	NA
Sodium (mirabilite)		40,690	36,458	37,868	52,018	[4]56,243
Sulfur:						
Native, from caliche		17,771	--	--	10	10
Byproduct, all sources[e]		20,000	20,000	NA	NA	NA
Total		37,771	20,000	NA	10	10
Talc and related materials:						
Pyrophyllite		4,731	9,886	5,226	1,026	1,330
Steatite		964	882	2,930	1,452	[4]1,943
Talc		41,117	24,059	24,575	33,741	[4]35,981
Total		46,812	34,827	32,731	36,219	[4]39,254
Vermiculite		4,426	5,877	9,907	3,277	[4]5,542
Water, mineral-containing		73,271	97,489	125,746	92,755	107,840
Zeolite		12	25	30	40	30
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural		5,880	873	992	1,186	[4]1,251
Coal, bituminous	thousand tons	434	727	389	498	515
Coke, all types, including breeze	do	686	[r]630	546	451	530
Gas, natural:						
Gross	million cubic feet	406,265	452,570	475,535	481,305	[4]543,875
Marketed	do	259,678	283,560	270,000	294,147	[4]333,848
Natural gas liquids:						
Natural gasoline	thousand 42-gallon barrels	[r]25	NA	NA	NA	NA
Butane	do	[r]1,203	[r]1,318	1,670	2,211	2,000
Propane	do	[r]1,439	[r]1,586	2,069	3,019	3,000
Total	do	[r]2,667	[r]2,904	3,739	5,230	5,000

See footnotes at end of table.

Table 1.—Argentina: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Peat, agricultural	4,447	3,516	4,560	2,460	[4]2,718
Petroleum and refinery products:					
Crude—thousand 42-gallon barrels	165,138	172,554	179,676	181,476	[4]178,937
Refinery products:					
Gasoline—do	38,948	39,770	44,009	43,658	[4]44,315
Kerosine—do	5,107	4,078	4,587	3,298	[4]3,387
Jet fuel—do	4,506	4,865	6,072	6,102	[4]5,104
Distillate fuel oil—do	49,079	50,688	55,100	56,232	[4]56,095
Residual fuel oil—do	56,640	56,826	51,159	51,132	[4]46,835
Lubricants—do	1,791	2,145	1,939	1,871	[4]2,199
Other—do	8,482	19,202	13,629	12,808	[4]13,966
Refinery fuel and losses—do	8,597	4,800	13,121	14,874	[4]11,317
Total—do	173,150	182,374	189,616	189,975	183,218

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through July 15, 1983.

[2]In addition to the commodities listed, cadmium, lime, perlite, and carbon black are produced, but output is not reported quantitatively and available information is inadequate to make reliable estimates of output levels.

[3]Revised to not available.

[4]Reported figure.

[5]Hot-rolled semimanufactures only; excludes castings and cold-rolled semimanufactures produced from imported hot-rolled semimanufactures.

[6]Includes plastic, semiplastic, and/or ferruginous clays used totally in the manufacture of portland cement.

[7]Thomas slag production was estimated from the Thomas crude steel reported in the 1980-81 annual publication of La Siderurgia Argentina and from a percentage of slag produced from Thomas crude steel reported during 1974-76; for 1979-81, from the reports published by the Instituto Argentino de Siderurgia in 1982.

TRADE

A series of devaluations in both 1981 and 1982 encouraged exports. There was an improvement in the balance of trade because of a severe cutback in imports, a local industrial depression, and other difficulties.

Total exports, valued at $7.6 billion, declined by an estimated 16%, while total imports of $5.35 billion decreased 43%, leaving a merchandise trade surplus of $2.25 billion. Imports decreased because of a continuation of a severe recession in industrial activity, a substantial real devaluation of the peso against the dollar, the highest inflation rate in the world, swollen import inventories from previous years, a reduction in Government investment levels, a sharp drop in private sector fixed investment, a scarcity of foreign exchange leading to payment delays for imports, and the trade disruption caused by the South Atlantic crisis with Great Britain.

Argentina's mineral imports in 1982 totaled $800 million and exports totaled $47 million. Imports of petroleum, valued at $176.4 million, decreased 45% compared with those of 1981, while imports of natural gas from Bolivia, valued at $378.5 million, increased 16% from those of 1981. Imports of liquefied natural gas (LNG) were reduced to zero compared with 232,000 tons in 1981. Imports of bituminous coal, valued at $65.4 million, remained at the same level as those of 1981; imports were mainly from Colombia, the United States, and Canada. Mineral exports were mainly lead, tin, silver, and borates.

Table 2.—Argentina: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	2	2	--	All to Uruguay.
Metal including alloys:				
Unwrought	29,422	66,088	--	Netherlands 29,289; Japan 28,071; India 5,999.
Semimanufactures	4,543	7,931	--	India 3,102; Japan 1,931; Netherlands 999.
Beryllium: Ore and concentrate	37	64	64	
Chromium: Oxides and hydroxides	1	(1)	--	All to Paraguay.
Copper: Metal including alloys:				
Unwrought value, thousands	--	$4	--	All to Uruguay.
Semimanufactures	118	55	--	Paraguay 23; Ecuador 16; Bolivia 5.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	NA	126	7	West Germany 39; China 30; Uruguay 16.
Steel, primary forms	233,368	121,873	--	Italy 31,598; Uruguay 26,060; Algeria 23,753.
Semimanufactures:				
Bars, rods, angles, shapes, sections	137,148	107,225	2,774	China 30,104; Iraq 28,524; Paraguay 23,695.
Universals, plates, sheets	32,612	14,148	--	Thailand 2,888; Paraguay 2,846; Uruguay 2,314.
Hoop and strip	426	128	--	Paraguay 58; Uruguay 52; Netherlands 11.
Rails and accessories	35	110	--	Bolivia 98; Chile 9; Uruguay 3.
Wire	5,049	4,637	--	Paraguay 1,805; Bolivia 1,098; Panama 800.
Tubes, pipes, fittings	129,147	88,501	20,572	China 15,358; Saudi Arabia 8,015; Brazil 7,193.
Castings and forgings, rough	63	2	--	Italy 1; Uruguay 1.
Lead:				
Ore and concentrate	r6,233	15,180	93	Finland 7,436; Mexico 5,693.
Oxides	(2)	(1)	--	All to Paraguay.
Metal including alloys:				
Unwrought	628	NA		
Semimanufactures	6	1	--	All to Paraguay.
Manganese: Ore and concentrate	16	5	--	West Germany 3; Hong Kong 1.
Mercury value, thousands	$2	$25	--	All to Uruguay.
Metalloids	167	1	--	All to Paraguay.
Nickel: Metal including alloys, semimanufactures value, thousands	$1	$2	$1	Paraguay $1.
Silver:				
Waste and sweepings do.	$161	$73	$56	France $17.
Metal including alloys, unwrought and partly wrought do.	$3,308	$14,334	$3,441	United Kingdom $6,646; West Germany $2,950; France $1,287.
Tin:				
Ore and concentrate	--	1,885	--	United Kingdom 1,740; Chile 145.
Metal including alloys, semimanufactures	1	(3)	--	Uruguay;[4] Paraguay.[5]
Titanium: Oxides	6	NA		
Tungsten: Metal including alloys, all forms value, thousands	$1	$120	--	Sweden $117; West Germany $3.
Zinc:				
Ore and concentrate	19,009	35,798	--	Finland 25,808; Brazil 9,990.
Oxides	34	3	--	All to Paraguay.
Blue powder	18	14	--	All to Uruguay.
Metal including alloys:				
Unwrought	481	NA		
Semimanufactures	24	61	--	All to Uruguay.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	19	6	--	Bolivia 1; Chile 1; Ecuador 1.
Asbestos, crude	6	2	--	All to Paraguay.
Boron materials:				
Crude natural borates	5,967	558	396	Brazil 162.
Oxides and acids	1,348	3,259	970	Brazil 1,954; Uruguay 270; Spain 36.
Cement	4,490	2,080	--	Bolivia 1,458; Chile 325; Paraguay 267.
Chalk	539	114	--	All to Paraguay.
Clays and clay products:				
Crude	9,653	5,753	--	Brazil 2,687; Chile 1,275; Bolivia 782.
Products:				
Nonrefractory	1,170	1,121	34	Bolivia 602; Paraguay 198; Venezuela 153.
Refractory including nonclay brick	553	227	--	Paraguay 155; Bolivia 53; Colombia 8.

See footnotes at end of table.

Table 2.—Argentina: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Diamond: Industrial value, thousands	$31	NA		
Diatomite and other infusorial earth	20	NA		
Feldspar, fluorspar, related materials	264	432	--	Chile 116; Bolivia 90; Ecuador 90.
Fertilizer materials: Manufactured:				
Ammonia	226	476	--	Uruguay 238; Chile 217; Bolivia 12.
Nitrogenous	798	338	--	Uruguay 335; Paraguay 3.
Phosphatic	495	2,852	--	Brazil 2,652; Paraguay 200.
Potassic	100	310	--	All to Bolivia.
Unspecified and mixed	85	159	--	Bolivia 145; Lebanon 7; Paraguay 6.
Gypsum and plaster	10,021	1,665	--	All to Paraguay.
Lime	13	10	--	All to Bolivia.
Mica: Crude including splittings and waste	2,202	846	--	West Germany 828; Uruguay 17.
Nitrates, crude	13	5	--	All to Paraguay.
Pigments, mineral:				
Natural, crude	10	NA		
Iron oxides and hydroxides, processed	124	113	10	Uruguay 75; Bolivia 22; Paraguay 6.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$48	$152	--	West Germany $105; Italy $27; Japan $15.
Synthetic do.	$1	NA		
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	250	101	--	All to Bolivia.
Sodium hydroxide	159	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	13,329	16,907	45	Italy 9,891; France 495; Spain 373.
Dolomite, chiefly refractory-grade	1,677	993	--	Chile 970; Paraguay 23.
Gravel and crushed rock	139	47	--	All to Paraguay.
Quartz and quartzite	57	21	--	All to Chile.
Sand other than metal-bearing	317	3	--	All to Paraguay.
Sulfur:				
Elemental:				
Crude including native and by-product	7	141	--	Do.
Sulfuric acid	673	571	--	Uruguay 471; Bolivia 50; Paraguay 50.
Talc, steatite, soapstone, pyrophyllite	217	5	--	All to Paraguay.
Other:				
Crude	934	555	--	Brazil 455; Uruguay 100.
Slag and dross, not metal-bearing	968	442	--	United Kingdom 390; Belgium-Luxembourg 52.
Oxides and hydroxides of barium, magnesium, strontium	1	NA		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	2,362	443	--	Bolivia 308; Paraguay 76; Chile 57.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	312	--	Paraguay 128; Brazil 94; Chile 70.
Carbon: Carbon black	5,762	4,760	--	Brazil 2,802; Chile 1,654; Uruguay 299.
Coke and semicoke	47,695	904	--	Uruguay 791; Paraguay 113.
Gas, natural thousand cubic feet	53	r(2)	NA	NA.
Hydrogen, helium, rare gases	4	4	--	All to Colombia.
Petroleum refinery products:				
Gasoline, motor 42-gallon barrels	3,094	42,126	--	Uruguay 34,638; Paraguay 7,488.
Mineral jelly and wax do.	32,188	56,758	19,525	Peru 19,675; Bolivia 8,067; Uruguay 4,824.
Kerosine and jet fuel do.	1,124	1,008	--	All to Paraguay.
Distillate fuel oil thousand 42-gallon barrels	(2)	1,315	--	Brazil 1,141; Uruguay 174.
Lubricants 42-gallon barrels	36,624	11,606	280	Paraguay 7,742; Uruguay 1,477; Chile 917.
Nonlubricating oils do.	133	NA		
Residual fuel oil do.	1,802,369	7,973,405	196,436	Netherlands 3,429,927; Italy 3,231,638; Brazil 760,679.
Bitumen and other residues do.	29,894	393	--	Uruguay 388.
Bituminous mixtures do.	16,726	72,842	--	Paraguay 69,881; Peru 2,009; Uruguay 581.
Petroleum coke do.	1,309,182	1,689,034	--	Netherlands 310,657; Brazil 285,384; Japan 241,214.

See footnotes at end of table.

Table 2.—Argentina: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Tars and other crude chemicals derived from coal, gas, and petroleum	5,750	7,885	1,050	Netherlands 3,575; Paraguay 1,320; West Germany 1,196.

rRevised. NA Not available.
[1]Undisclosed quantity valued at $1,000.
[2]Less than 1/2 unit.
[3]Undisclosed quantity valued at $11,000.
[4]Undisclosed quantity valued at $7,000.
[5]Undisclosed quantity valued at $4,000.

Table 3.—Argentina: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	38	31	2	Brazil 27; United Kingdom 2.
Aluminum:				
Ore and concentrate	21,630	18,527	1,445	Guyana 5,946; China 5,511; Brazil 4,344.
Oxides and hydroxides	229,685	251,824	31,792	Australia 213,946; China 2,650; West Germany 2,296.
Metal including alloys:				
Unwrought	18	28	27	United Kingdom 1.
Semimanufactures	772	1,724	668	West Germany 340; Brazil 226; Spain 106.
Chromium:				
Ore and concentrate	5,164	9,734	--	Republic of South Africa 5,234; Philippines 4,500.
Oxides and hydroxides	82	162	1	U.S.S.R. 150; West Germany 11.
Cobalt: Oxides and hydroxides	11	16	2	Belgium-Luxembourg 14.
Copper:				
Ore and concentrate	68,897	5	--	All from Chile.
Metal including alloys:				
Scrap	716	164	137	Chile 26; Brazil.[1]
Unwrought	47,525	38,517	32	Chile 34,320; Peru 3,727; Belgium-Luxembourg 308.
Semimanufactures	837	1,439	254	West Germany 350; Japan 294; Chile 241.
Iron and steel:				
Iron ore and concentrate thousand tons	2,919	2,391	--	Brazil 2,192; Peru 86; Venezuela 59.
Metal:				
Scrap	6,399	1,574	8	Chile 1,458; Japan 70; Italy 33.
Pig iron, cast iron, related materials	185,483	160,539	1,809	Brazil 146,174; Japan 8,556; Republic of South Africa 1,468.
Ferroalloys	3,070	5,734	483	Brazil 1,907; Republic of South Africa 1,468; West Germany 907.
Steel, primary forms	503,579	651,177	79	Japan 234,338; Brazil 106,369; Italy 57,319.
Semimanufactures:				
Bars, rods, angles, shapes, sections	20,554	40,358	7,495	West Germany 10,717; Belgium-Luxembourg 7,635; United Kingdom 5,382.
Universals, plates, sheets	148,797	238,372	18,579	Japan 98,572; Brazil 35,655; West Germany 29,162.
Hoop and strip	7,590	20,678	2,840	Brazil 13,389; West Germany 1,143; Japan 1,112.
Rails and accessories	4,267	13,623	341	France 10,845; Austria 1,033; Brazil 446.
Wire	2,851	8,284	181	Uruguay 3,328; Brazil 1,257; Sweden 509.
Tubes, pipes, fittings	14,270	111,456	4,836	Netherlands 76,117; Venezuela 10,831; Japan 6,316.
Castings and forgings, rough	495	1,014	23	Belgium-Luxembourg 461; Spain 286; Panama 68.

See footnotes at end of table.

Table 3.—Argentina: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	60	80	--	All from Bolivia.
Oxides	182	748	13	Mexico 487; Peru 242; United Kingdom 5.
Metal including alloys:				
Scrap	1,031	1,528	767	Chile 760.
Unwrought	4,711	5,097	510	Peru 2,254; Mexico 1,695; United Kingdom 560.
Semimanufactures	62	94	1	Brazil 51; Italy 40; United Kingdom 1.
Magnesium: Metal including alloys:				
Unwrought	NA	426	377	Norway 49.
Semimanufactures	NA	75	68	Italy 5; Canada 1.
Manganese:				
Ore and concentrate	87,334	58,891	--	Brazil 58,408; Bolivia 451; France 18.
Oxides	--	1,854	187	Brazil 1,470; Greece 145; Japan 25.
Mercury 76-pound flasks	1,857	35	--	Mexico 34; West Germany 1.
Metalloids	3,517	1,894	2	West Germany 1,172; Belgium-Luxembourg 400; Brazil 127.
Molybdenum: Metal including alloys, all forms	4	9	6	Austria 1; France 1.
Nickel: Metal including alloys:				
Scrap	4	--		
Unwrought	825	636	299	Canada 104; Norway 79; Australia 40.
Semimanufactures	295	244	50	West Germany 70; France 60; United Kingdom 29.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$461	$779	$347	West Germany $259; France $153; United Kingdom $20.
Silver: Metal including alloys, unwrought and partly wrought do	$1,439	$13,082	$1,668	Belgium-Luxembourg $5,469; United Kingdom $1,501; Chile $1,482.
Tin:				
Ore and concentrate	226	552	--	All from Bolivia.
Oxides	6	NA		
Metal including alloys:				
Unwrought	980	674	--	Bolivia 345; Brazil 327; Japan 2.
Semimanufactures	22	7	3	United Kingdom 2; West Germany 1.
Titanium:				
Ore and concentrate	748	3,372	15	Australia 1,860; Republic of South Africa 1,422; Netherlands 50.
Oxides	1,205	653	41	Belgium-Luxembourg 172; West Germany 150; United Kingdom 137.
Tungsten:				
Ore and concentrate	1,052	NA		
Metal including alloys, all forms	32	46	4	Sweden 27; United Kingdom 10; Brazil 1.
Zinc:				
Oxides	491	688	90	Uruguay 218; United Kingdom 145; West Germany 61.
Blue powder	2,388	246	21	Mexico 150; Brazil 55; Belgium-Luxembourg 20.
Metal including alloys:				
Scrap	--	89	89	
Unwrought	1	2,953	60	Peru 1,711; Canada 694; Mexico 455.
Semimanufactures	185	247	22	Mexico 150; Brazil 55; Belgium-Luxembourg 20.
Other:				
Ores and concentrates	398	246	--	Bolivia 242; Mexico 4.
Base metals including alloys, all forms	569	262	74	Republic of South Africa 109; Mexico 19; Belgium-Luxembourg 17.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	439	386	314	Uruguay 60; Brazil 7; Italy 5.
Artificial: Corundum	4,829	4,428	2	Brazil 3,243; France 815; West Germany 174.
Dust and powder of precious and semiprecious stones value, thousands	$307	$944	$601	Belgium-Luxembourg $314; Netherlands $17; Italy $3.
Grinding and polishing wheels and stones	134	347	68	Italy 125; Brazil 36; United Kingdom 35.
Asbestos, crude	21,800	20,149	39	Canada 10,997; Republic of South Africa 9,083.

See footnotes at end of table.

Table 3.—Argentina: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Barite and witherite	4,293	6,418	266	Bolivia 6,093; Chile 30; France 24.
Boron materials: Oxides and acids	39	12	--	All from Belgium-Luxembourg.
Cement	199,903	235,682	1,810	Chile 61,275; Uruguay 57,814; Brazil 54,987.
Chalk	424	478	3	Switzerland 332; Belgium-Luxembourg 136; United Kingdom 6.
Clays and clay products:				
Crude	22,199	19,670	14,893	Brazil 1,893; United Kingdom 471; Spain 345.
Products:				
Nonrefractory	45,531	89,942	25	Brazil 46,147; Italy 29,464; Uruguay 10,137.
Refractory including nonclay brick	41,946	NA		
Cryolite and chiolite	23	33	--	Denmark 20; China 10; Belgium-Luxembourg 2.
Diamond:				
Gem, not set or strung value, thousands	$265	$259	$37	Belgium-Luxembourg $124; Israel $92; West Germany $5.
Industrial ---do---	$128	$624	$158	Belgium-Luxembourg $437; Netherlands $21; Japan $3.
Diatomite and other infusorial earth	3,390	2,229	1,407	Mexico 517; Chile 305.
Fertilizer materials:				
Manufactured:				
Nitrogenous	15,808	18,173	2,861	Venezuela 10,025; West Germany 2,127; Belgium-Luxembourg 868.
Phosphatic	53,805	11,318	2,052	Uruguay 5,312; Brazil 2,750; Israel 704.
Potassic	18,948	14,560	4,201	Israel 4,100; East Germany 4,000; West Germany 2,018.
Unspecified and mixed	81,237	105,912	97,365	Uruguay 5,005; Brazil 1,885; Chile 1,450.
Graphite, natural	505	725	65	Republic of Korea 243; Brazil 192; West Germany 59.
Gypsum and plaster	13	61	9	West Germany 30; Japan 7; United Kingdom 7.
Halogens	88	163	23	West Germany 108; Belgium-Luxembourg 32.
Lime	2,000	2,687	--	All from Brazil.
Magnesium compounds: Magnesite	25,729	8,794	7	Brazil 7,000; Austria 1,520; Netherlands 131.
Mica:				
Crude including splittings and waste	12	39	14	France 13; Norway 10; Brazil 1.
Worked including agglomerated splittings	14	16	4	France 3; West Germany 3; Spain 3.
Nitrates, crude	3,455	3,050	--	All from Chile.
Phosphates, crude	8	9	--	All from Brazil.
Pigments, mineral:				
Natural, crude	25	NA		
Iron oxides and hydroxides, processed	452	1,027	21	West Germany 452; Spain 301; Brazil 221.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	r$165	$168	--	Brazil $72; India $28; Thailand $28.
Synthetic ---do---	$8	$21	$2	Switzerland $11; West Germany $3; Hong Kong $2.
Pyrite, unroasted	96	46	--	All from West Germany.
Salt and brine	43	85	16	West Germany 36; United Kingdom 24; Switzerland 7.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	842	293	1	Belgium-Luxembourg 135; West Germany 65; Italy 27.
Sodium carbonate, natural and manufactured	213,080	131,214	13,159	Spain 37,254; Romania 27,021; Bulgaria 18,530.
Sodium hydroxide	51,318	55,185	33,123	Brazil 10,857; France 7,922; West Germany 1,134.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	12,589	16,034	63	Italy 7,099; Brazil 3,798; Uruguay 1,732.
Worked	147	810	28	Italy 513; Brazil 121; Spain 70.

See footnotes at end of table.

Table 3.—Argentina: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Dolomite, chiefly refractory-grade	4,595	1,826	--	Uruguay 1,680; Italy 146.
Gravel and crushed rock	1,538	243	105	Uruguay 127; Belgium-Luxembourg 5; France 5.
Quartz and quartzite	525	629	--	Sweden 349; Switzerland 250; Belgium-Luxembourg 30.
Sand other than metal-bearing	r79,219	55,729	968	Uruguay 52,801; Brazil 1,929; West Germany 30.
Sulfur:				
Elemental:				
Crude including native and by-product	125,649	55,330	23,042	Canada 29,300; Netherlands 2,635; Uruguay 200.
Colloidal, precipitated, sublimed	190	49	46	West Germany 3.
Dioxide value, thousands	$1	NA		
Sulfuric acid	374	2,422	--	Uruguay 2,400; West Germany 20; France 2.
Talc, steatite, soapstone, pyrophyllite	551	510	50	China 180; Brazil 90; France 56.
Other:				
Crude	3,803	4,830	475	Mexico 3,026; Japan 735; Australia 265.
Slag and dross, not metal-bearing	151	20	--	All from Brazil.
Oxides and hydroxides of barium, magnesium, strontium	271	3,193	2,895	West Germany 123; United Kingdom 43; Brazil 40.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	276	751	33	Brazil 308; West Germany 130; Uruguay 94.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	75	141	139	Brazil 1.
Carbon: Carbon black	2,220	2,172	431	Mexico 1,101; Canada 290; France 82.
Coal:				
Anthracite and bituminous	405,159	788,278	674,014	Poland 45,766; Canada 44,000.
Briquets of anthracite and bituminous coal	528,048	10	--	All from Colombia.
Lignite including briquets	129	245	245	
Hydrogen, helium, rare gases	204	NA		
Peat including briquets and litter	165	73	--	Netherlands 59; West Germany 13.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	12,875	15,971	--	Saudi Arabia 8,908; Iraq 3,684; Nigeria 939.
Refinery products:				
Gasoline, motor do	2,745	1,626	2	Brazil 1,091; Italy 169; Canada 160.
Mineral jelly and wax 42-gallon barrels	7,799	9,043	3,542	West Germany 2,762.
Kerosine and jet fuel thousand 42-gallon barrels	3,051	612	(1)	Mainly from Brazil.
Distillate fuel oil do	3,860	94	--	All from Netherlands Antilles.
Lubricants do	95	300	151	Venezuela 139; West Germany 3; United Kingdom 2.
Nonlubricating oils 42-gallon barrels	1,106	NA		
Bituminous mixtures do	854	819	630	West Germany 112; United Kingdom 42; Belgium-Luxembourg 28.
Petroleum coke do	336,254	359,134	359,134	
Tars and other crude chemicals derived from coal, gas, and petroleum	71,066	49,782	8,494	Netherlands 636; Brazil 60; Spain 60.

rRevised. NA Not available.
1Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The only primary and secondary production of aluminum in Argentina is now done by Aluminios Argentinos S.A.I.C., whose facilities have an annual production capacity of 144,000 tons of ingots. However, in 1982, several foreign companies have shown interest in financing the expansion of three Government mining projects in the Río Gallegos area in the south of the country. Gerald Metals Ltd. was considering investing in a second aluminum smelter at Punta Loyola, using nearby hydroelectric resources. Initially, the proposed aluminum smelter would use natural gas and coal, which are also available locally, but it would use hydroelectric power once generating capacity was installed.

Production of primary aluminum during 1982 increased 2%; domestic sales rose to 50,282 tons, up from 34,463 tons in 1981. Aluminum exports fell to 67,023 tons, down from 85,927 tons in 1981.

Copper.—Argentina continued to show interest in developing its major mineral deposits and in attracting foreign investment.

The main projects that the Government has targeted for development are the Bajo la Alumbrera porphyry copper-molybdenum-gold deposit, the Farallón Negro gold-silver-manganese deposit, both in Catamarca Province, and the Nevados del Famatina molybdenum-copper deposit in La Rioja Province.

The first mining project approved by Decree No. 2234/81 and called for international tenders was the Nevados del Famatina. The bid package covered completion of the first stage of geological exploration of the area, with a right of option in the second stage for its exploitation and beneficiation. This mineral deposit covers 2,200 hectares, and the preliminary estimated ore reserves from one-fourth of the mineralized area amounted to 200 million tons averaging 0.06% molybdenum and 0.17% copper.

Originally the Government had set July 30, 1982, for the opening of bid proposals, but because of the Falklands war, all international bidding in exploration rights on the Nevados del Famatina deposit was suspended until further notice.

El Pachón, a copper mine project in San Juan Province, owned by Cía. Minera Aguilar S.A. (C.M.A.S.A.), a subsidiary of St. Joe Minerals Corp., which is a part of Fluor Corp., was scheduled to begin production of copper and molybdenum by the mid-1980's. It has estimated reserves of 800 million tons averaging 0.67% copper and 0.016% molybdenum. Development of this project has been delayed several times in the past.

In the Government's mining program for 1982, additional technical and economic studies were conducted on the Bajo la Alumbrera porphyry copper deposit in Catamarca Province, under the supervision of the Subsecretaría de Minería de la Nación, the Dirección General de Fabricaciones Militares (DGFM), and the state-owned company Yacimientos Mineros de Agua de Dionisio (YMAD). This mineral deposit contains reserves previously estimated at 350 million tons of ore. The ore averages 0.49% copper, 0.62 gram of gold, 2.5 grams of silver, and 0.008% molybdenum per ton with a 0.2% copper cutoff grade. The contract work being done by the University of San Juan calls for a review of all new data now available, which includes recent drilling results, not only from the main deposits, but also from the satellite ore bodies. These studies are expected to continue in 1983.

In the vicinity of the same copper deposits, the Plan Noroeste Argentino (Plan NOA) was planning in 1983 to open bidding on the Cerro Atajo copper deposit located near Andalgalá, Catamarca Province. The decision was made after the completion of 2,800 meters of core drilling and 3,000 meters of exploration drifting. Preliminary ore reserves showed 105,000 metric tons of ore grading 5% copper, 0.8 ounce of gold per ton, and some wolframite, and an additional 800,000 tons of ore grading 1.5% to 2.0% copper.

Iron Ore.—Argentina is partially dependent on imported iron ore for its steel industry. Domestic ore is processed in the pelletizing plant of HIPASAM. The plant, comprising a differential flotation plant using the dephosphorization process, iron ore slurry pipeline, and four pelletization lines with a 2-million-ton capacity, is located in Río Negro Province, 30 kilometers from the Atlantic coast.

HIPASAM has been supplying up to 40% of the iron ore needs of blast furnace No. 2, the steel plant of Sociedad Mixta Siderúrgia Argentina (SOMISA). HIPASAM pellets will also provide 30% of the requirements of blast furnace No. 1 of SOMISA, scheduled to be completed in 1983. The balance of the

necessary iron ore needs, or about 50%, is met by sinter made by the company from imported ore. When operating at capacity, SOMISA blast furnaces can take all of the pellets produced by HIPASAM. Production of iron ore and pellets decreased 20% compared with that of 1981, owing to the slow recovery of the market and shutdown of the No. 2 blast furnace of SOMISA.

Brazil has been the principal source of imported ore. Current plans are to increase steel production capacity from 5 million tons in 1982 to 11.9 million tons by 1990. The additional iron requirements will be imported from the Carajás deposit in Brazil.

Iron and Steel.—Crude steel production increased 15% in 1982 compared with that of 1981. Installed plant capacity was utilized at a 58% level for blast furnaces and 60% level for direct-reduction plants.

Production of primary iron (pig iron and sponge iron) was up about 12%. Output of hot- and cold-rolled steel increased by 16% and 22%, respectively.

ACINDAR-Industria Argentina de Aceros S.A., Argentina's newly expanded private sector steelmaker, was planning to expand its direct-reduction capacity by uprating its Midrex plant. The plant, with a current rated operating capacity of 400,000 tons per year, announced plans to increase capacity to 600,000 tons. ACINDAR's need for additional iron units dates back to its takeover in 1982 of the Gurmendi S.A., Genaro Grasso S.A., and Santa Rosa S.A. steel plants in a move that was designed to relieve state-owned SOMISA of its role as a supplier of billets to the private sector. ACINDAR operated at full capacity in the second half of 1982, which resulted in a total output for the year of 450,000 tons.

In 1982, Nippon Steel Corp. and other Japanese companies decided not to invest $50 million in a modernization project with SOMISA. The original agreement called for the Japanese consortium to provide funds for modernizing and expanding SOMISA's steel plant in exchange for orders of a hot-strip mill, a blast furnace revamp, and other contracts. The project was suspended for at least 2 years, according to SOMISA's officials, owing to financial problems. Earlier, Nippon Steel had completed upgrading SOMISA's No. 1 blast furnace and had been planning to begin work on the No. 2 furnace. The status of this future modernization is now uncertain.

Altos Hornos Zapla in Jujuy Province, which is self-sufficient in iron ore, announced plans to carry out a program for completing the installation and transformation of three Thomas converters, to be completed in 1984. A sinter plant of 350,000-ton capacity was to be installed in the pig iron section for a total investment of $120 million. Another steel producer, Dalmine Siderca S.A.I.C., announced plans to expand their capacity by 90,000 tons per year of tubing and 175,000 tons per year of steel, for a total investment of $55 million. The expansion should be finished in 1984.

Siderúrgica del Sur, a new private consortium formed with domestic and foreign capital, submitted a proposal to establish a steel plant in San Astonio Oeste, Río Negro Province. The direct-reduction plant will use the Mexican Hyl-III process, and will have an initial production capacity of 550,000 tons per year. Total capital investment for the project was estimated at $330 million. The second stage of the project will include an electric furnace and a continuous hot-roller strip with an output of 350,000 tons of billets per year.

During the year, Sindisa-Siderúrgica Integrada S.A.I.C., the state-owned concern that is a part of DGFM, announced preliminary plans to build a 4-million-ton-per-year steel plant with an initial capital investment of $150 million.

Table 4.—Argentina: Iron and steel production

(Thousand tons)

Year	Pig iron and sponge iron	Crude steel	Hot-rolled steel[1]	Cold-rolled steel[2]
1978	1,825	r2,786	r2,566	r778
1979	1,938	r3,203	r3,010	r867
1980r	1,793	2,702	2,643	675
1981r	1,736	2,527	2,193	556
1982e	1,940	2,897	2,545	679

eEstimated. rRevised.
[1]Includes structural steel.
[2]Includes plate and tin plate.

Source: Consejo Técnico de Inversiones S.A. (Buenos Aires). Anuario-1982 (The Argentine Economy, 1982), p. 183.

Lead, Silver, and Zinc.—Compared with that of 1981, production of lead concentrates in 1982 declined 15%, zinc concentrates increased a modest 3%, and silver declined 12%.

C.M.A.S.A. mined and milled about 668,000 tons of ore. Reserves at the mine were estimated at 6.6 million metric tons of ore containing 6.2% lead, 7.6% zinc, and 3.7 ounces of silver per ton.

The Government provided a $230,000 loan to Cía. Río Cincel S.A. to further explore and increase reserves in its lead-silver-zinc Pan de Azucar Mine, located in Jujuy Province, 57 kilometers west of the town of Abra Pampa. The project should be completed sometime in 1984.

Cía. Cerro Castillo S.A., the largest gold producer in Argentina, received a $240,000 loan to finance further exploration of the Susana Beatriz and Angela lead-zinc-gold-silver mines located in Chubút Province.

Another exploration prospect for lead-silver-zinc-gold was located near Huemules, Chubút Province. This is a cooperative project between the Government and the United Nations Revolving Fund. Negotiations during the year involved the consideration of a $4 million contribution by the United Nations to further develop the project. At yearend no decision had been reached.

Manganese.—Production of manganese was carried out by Cía. Luis Pedro Cámara in Córdoba Province, YMAD in Catamarca Province, and Sociedad Argentina Minera de Extracción y Transportación S.A. in Santiago del Estero Province. Production of manganese has been decreasing from 18,500 metric tons in 1978 to an estimated 1,800 metric tons in 1982. According to Argentine sources, most of the production of manganese in 1982 came from Córdoba Province, followed by Santiago del Estero and Catamarca Provinces. The most important mine was Farallón Negro because of the additional revenue from gold and silver values in the concentrates. The Farallón Negro Mine is operated by YMAD, a state-owned entity. Current known reserves amount to about 2.5 million tons with an average content of 12% manganese, 7 grams of gold, and 113 grams of silver per ton.

Tungsten.—Production of tungsten, most of which comes from San Luis and Córdoba Provinces, has been declining since 1978. Two loans of $350,000 and $136,000 were approved for Cía. Mincor S.A. in San Luis Province and Cía. Cerro Catedral S.A. in Córdoba Province for further exploration of two tungsten deposits, the Cerro el Morro in San Luis Province and the La Bismutina alluvial deposit in Córdoba Province. As with other loans made for mineral exploration, the Government will assume 80% of the risk.

NONMETALS

Boron Minerals.—Production of borates increased 10% compared with the 1981 output. Exports of borates fell to fourth place among Argentine exports after cement, limestone, and clays. Borates were produced primarily in the Province of Salta and lesser amounts in the Province of Jujuy. In Salta Province, the main producer was Cía. Boroquímica S.A.M.I.C.A.F. from its open pit mine located at Tincalayú II, about 430 kilometers southwest of the city of Salta. Boroquímica S.A.M.I.C.A.F., started mining high-grade borates (30% to 32%) in 1957. In 1971, a pilot plant to treat low-grade ore (18% B_2O_3) was installed, but it did not begin operating until September 1978. The firm currently has two processing plants, one in Campo Quijano and the other in Tincalayú, both fed by low-grade ore averaging 18% B_2O_3.

The open pit mine where high-grade ore was originally mined was expanded in width and depth. Ore extracted from the Tincalayú Mine, Salar del Hombre Muerto, is crushed and ground at the minesite and shipped by truck to a Tincalayú plant and stockpiled. It is then blended to obtain the 18% B_2O_3. The ore is then shipped by truck and train to the Campo Quijano processing plant.

Cement.—Production of cement decreased 16% in 1982 compared with that of 1981. Nineteen cement plants operated during the year. These were located in 11 Provinces and had a total installed annual capacity of almost 11 million tons. They were privately owned. Domestic demand for cement fell, but exports increased in volume and value. Cement plants were running at 54% production capacity.

In 1981-82, Loma Negra Compañía Industrial Argentina S.A. (Loma Negra C.I.A.S.A.) built a new $190 million cement plant at El Alto in Catamarca Province with an installed capacity of 300,000 tons per year. Cementera Santa Cruz S.A. announced plans to build a new $60 million plant at Pico Truncado, Santa Cruz Province, with an annual installed capacity of 600,000 tons. Three cement plants expanded their capacity as follows, in tons per year: Loma Negra C.I.A.S.A. at the Olavarría

plant, 150,000; the Zapala plant in Neuquén Province, 210,000; and Corporación Cementera Argentina S.A. (Corcemar) at the Capdeville plant in Mendoza Province, 100,000. Corcemar was constructing a new plant at Volcán, Jujuy Province, with 330,000 tons per year annual capacity.

Table 5.—Argentina: Cement statistics

(Thousand tons unless otherwise specified)

	1978	1979	1980	1981	1982[p]
Capacity	8,650	8,855	10,326	10,264	10,984
Production	6,316	6,667	7,133	6,651	5,614
Sales	6,314	6,662	7,109	6,604	5,586
Apparent per capita consumption kilograms	245	253	263	232	230

[p]Preliminary.

Source: Portland Cement Manufacturer's Association. Anuario-1982 (Business Trends), p. 348.

Table 6.—Argentina: Structure of the cement industry

Company	Number of plants	Installed capacity (thousand tons)
Loma Negra Compañía Industrial Argentina S.A. (Loma Negra C.I.A.S.A.)	6	4,840
Corporación Cementera Argentina S.A. (Corcemar)	5	2,919
Juan Minetti S.A	5	2,040
Calera Avellaneda S.A	1	875
Petroquímica Comodoro Rivadavia S.A	1	180
Sandrin Hnos S.A	1	130
Total	19	10,984

Source: Portland Cement Manufacturer's Association. Anuario-1982 (Business Trends), p. 348.

Salt.—The Government of La Pampa Province requested the Federal Investment Council to examine and evaluate a proposal for a project to produce numerous salts associated with common salts and sodium sulfate. The proposal also examined the possibility of industrialization of sodium carbonate, synthetic magnesite from magnesium salts, lithium, potassium, iodine, bromine, etc., which are still unexploited domestically. The La Pampa Province prefeasibility study contemplates a future detailed study as to the feasibility of recovering synthetic magnesite from magnesium salts. Such a development would require the calculation of reserves contained in the saltwater from the salt deposit. The synthetic magnesite project would cost $60 million and a plant to extract lithium from the same saltwaters would cost an additional $40 million.

MINERAL FUELS

Coal.—Argentina produced about 515,000 metric tons of bituminous coal from mines in the Río Turbio deposits in the southern region of Santa Cruz Province. The output was up 3.5% compared with that of 1981. Proven reserves at Río Turbio totaled 400 million tons. The coal is not of coking quality.

The Spanish Government's mineral exploration agency, Empressa Nacional Adaro de Investigaciones Mineras S.A., was awarded a $20 million contract by Argentina's Yacimientos Carboníferos Fiscales (YCF), to evaluate coal deposits in the Río Turbio coal-mining region of Patagonia. Early studies indicated that such deposits may contain metallurgical coal.

A 4-year project, initiated in 1982, which is to be financed by the World Bank, calls for expanding coal output at Río Turbio from 500,000 to 6 million tons annually. The project includes construction of a railway link to the minesite and the enlargement of the port facilities at Río Gallegos to unload vessels up to 60,000 tons. The Spanish exploration agency will also explore coal reserves in an area north of the Río Turbio district.

After signing a mutual cooperation agreement with Poland in 1982, Argentina announced plans to purchase more coal and mining equipment from Poland. Metallurgical coal imported from Poland will be mixed

with coal from Río Turbio. Imports of metallurgical coal increased 3.4% to 730,000 tons, with the United States supplying 85%; Poland, 6%; Canada, 6%; and Colombia, 3%.

Natural Gas.—Government agencies reported that in 1982 natural gas transported throughout Argentina was almost 12 million cubic meters, an increase of over 13% compared with that of 1981. It is expected that production of natural gas will increase in 1983. Present flaring losses are estimated at 20% of the gross gas production, but these losses should be reduced to 10% over the next 3 years and contribute to greater production.

Imports of natural gas from Bolivia amounted to $378 million. Reportedly, agreement has been reached on a new contract for purchasing natural gas from Bolivia. Volumes had been about 200 to 220 million cubic feet per day, but it was thought that volumes would be reduced by extending the life of the contract beyond 1992.

During 1982, an Argentine-U.S. group began planning a $2.3 billion natural gas project. The proposal involves exports of 500 million cubic feet per day, or 163 billion cubic feet per year, of LNG from Loma de la Lata Gasfield in the Neuquén Basin to the United States and possibly Japan. The project would generate $800 million per year, making it Argentina's single most important export sale to the United States. Approval for the project from the Government had not been issued at yearend.

The natural gas reserves to be used in the LNG trade are located at Loma de la Lata Field, Neuquén Province. The gas will be transported through a 42-inch pipeline to Puerto Madryn in Chubút Province, a distance of 350 miles, where the gas will be liquefied and loaded aboard LNG carriers to be transported to a U.S. receiving terminal. The capital cost of the project based on 1981 prices for the pipeline, liquefaction plant, and port was estimated at $2.3 billion.

Petroleum.—Petroleum output fell to a reported figure of 28.4 million cubic meters (178.9 million 42-gallon barrels) from 28.9 cubic meters (181.5 million 42-gallon barrels) in 1981, despite improved production at the state oil corporation, YPF. The number of oil wells drilled amounted to 793, of which 588 wells were drilled by YPF and 205 were drilled by private contractors.

Talks over the new terms of the renegotiated contract did not progress well, and the official deadline for contract negotiations to set prices for oil compulsorily sold to YPF was moved to late February 1983. The original agreement was scheduled to be completed by the end of the first week of January 1983. Oil industry sources say YPF had offered to raise top prices to about $130 per cubic meter, roughly equal to 60% of world market levels. These offers were met with a poor response from private sector contractors, who wish to retain some of their gas output. However, at yearend YPF had made no concession on this point.

YPF officials expected the new agreement to spur private sector output by as much as 25%. Argentina petroleum imports in 1982 declined about 43.1% compared with those of 1981. There also was a decrease in imports of oil byproducts.

Occidental Petroleum Corp. announced the discovery of a new oilfield in the Mendoza area of Argentina. It was the first discovery since Occidental began exploratory drilling in Argentina in 1981. Occidental is a contractor operator for two Argentine companies, Bridas S.A.P.I.C. and Cía. Química, and Unión Texas that have contracted with YPF. All exploration and drilling costs are born by the contractors. Occidental has a 37.5% interest in the 500,000-acre tract; Unión Texas, 32.5%; Bridas S.A.P.I.C., 20%; and Cía. Química, 10%. The Total Oil Co., which resumed exploration offshore in the Tierra del Fuego area during the summer of 1982, is said to have discovered a new hydrocarbon field.

Uranium-Nuclear Energy.—CNEA, continuing with its nuclear program, brought online a 150-ton-per-year uranium concentration plant at Los Gigantes, 60 kilometers west of Córdoba. The mining and processing plant began operations in November 1982, under a contract awarded by CNEA to Eduardo Sanchez Granel Obras de Ingeniería S.A.I.C.F.I. The company will continue exploring for uranium in the 100-square kilometers surrounding the plant area and also conduct laboratory analysis under CNEA guidance. According to officials, there are 5 million tons of low-grade ore reserves equivalent to 1,500 tons of uranium oxide (U_3O_8). CNEA believes that resources may total 3,000 tons of U_3O_8. A production contract calls for output of 150 tons per year of U_3O_8 that must be sold to CNEA at a negotiated price. The yellow cake will be transported by rail to CNEA plants in Córdoba and Mendoza for conversion to UO_2 pellets. The plant cost was estimated at $6.5 million at exchange rates prevailing in June 1982.

In 1982, CNEA reportedly was close to an agreement with a French consortium for a $150 million contract to develop the Sierra Pintada uranium ore body that contains an estimated 30,000 metric tons of U_3O_8. The contract would call for construction of a 700-ton-per-year concentrator and mill complex. Output of yellow cake during 1982 was estimated at 326 metric tons, a 61% increase over that of 1981.

According to the Argentine nuclear program, operations at the Malargue and San Rafaél plants continued with an output in 1982 of 180 metric tons of U_3O_8, 9% more than was scheduled.

One hundred and twenty tons of U_3O_8 was exported to the Brazilian company Empresas Nucleares Brasileiras S.A. as part of an agreement signed in 1980 between the two nations.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Argentine pesos (M$N) to U.S. dollars at the average exchange rate as of Mar. 21, 1983, of M$N65,100=US$1.00. The exchange rate as of Dec. 31, 1982, was M$N103,300=US$1.00.

The Mineral Industry of Australia

By Charlie Wyche[1]

The Australian minerals industry again faced depressed worldwide economic conditions, high interest rates, liquidity problems, metal surpluses, and falling prices. Nevertheless, the industry remained intact, new production records were established for a number of major commodities, and the value of output increased to a record level in excess of $9 billion.[2] However, overall industry recovery was seen as gradual, and the outlook for 1983 is for a holding operation rather than an expansion. Considerable excess production capacity existed for most mineral commodities, but can be quickly recommissioned to meet renewed demand.

Despite the poor performance, the mining industry maintained a high level of exploration expenditure of $450 million, compared with $350 million in 1981. The industry employed 81,200 people, an increase of 800 over the 1981 total. The mining industry's earnings represented over 35% of Australia's total export revenue. Some 70% of mining company sales revenue was derived from exports.

Foreign interests in the Australian minerals industry continued at a high level and provided not only capital, but new technology, managerial skills, and export market potential. The Government's foreign investment guidelines call for a 50% Australian equity and at least 50% Australian voting strength on the board of all new resource projects except for uranium where the Australian equity is 75%. There is sufficient flexibility to ensure that projects in the national interest can proceed to development with Australian equity and control below the 50% level.

PRODUCTION

Australia is well endowed with an exceptionally broad mineral and energy resource base and produces approximately 70 minerals. Despite a number of setbacks during 1982, strong growth continued in the coal and uranium industries, and new production records were achieved. Production of lead, nickel, natural gas, silver, tin, and zinc was also at record high levels, and gold output increased significantly. Production of bauxite declined, the result of an 8-week strike at Weipa, Queensland. Iron ore production increased slightly, because of fewer industrial disruptions and some stock accumulation; however, steel and manganese output declined. The economic downturn in the major consumer markets of the United States, Japan, and Europe adversely affected outlets for titaniferous concentrates.

Table 1.—Australia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Bauxite, gross weight ____ thousand tons	24,293	r27,583	r27,179	25,541	23,621
Alumina ____ do ____	6,776	7,415	7,246	7,079	6,631
Metal, refined ____ do ____	263	270	303	379	362
Antimony, Sb content of antimony and lead concentrates ____	1,519	1,539	1,184	1,130	1,021
Bismuth, mine output, metal content ____	1,054	1,189	e900	e850	e750
Cadmium:					
Mine output, metal content ____	1,528	1,843	1,738	1,785	2,215
Metal, smelter (refined) ____	747	804	1,012	1,031	1,010
Chromium: Chromite, gross weight ____	776	1,855	1,718	NA	NA
Cobalt:					
Mine output, analytic content of:					
Nickel ore ____	2,418	2,202	r2,640	2,319	2,511
Nickel concentrate ____	882	762	983	876	967
Zinc concentrate ____	93	82	r81	71	70
Total ____	3,393	3,046	r3,704	3,266	3,548
Recoverable cobalt[e] ____	1,350	1,500	1,600	1,666	1,810
Columbium-tantalum concentrate, gross weight ____	r138.8	r171.9	r159.2	297.9	299.3
Copper:					
Mine output, metal content ____	222,111	237,610	243,540	225,874	246,622
Metal:					
Smelter:					
Primary ____	164,395	166,260	174,920	173,494	175,624
Secondary ____	2,803	6,194	7,104	5,015	4,809
Refined:					
Primary ____	152,621	137,689	144,828	164,241	165,307
Secondary ____	26,321	34,800	21,146	15,832	10,209
Gold:					
Mine output, metal content ____ troy ounces ____	647,579	596,910	547,591	567,814	880,927
Metal, refined (excluding recovery from scrap) ____ do ____	578,327	533,798	474,576	481,971	826,627
Iron and steel:					
Iron ore:					
Gross weight ____ thousand tons ____	83,134	91,717	r95,534	84,718	87,789
Iron content ____ do ____	52,825	57,846	60,270	53,679	55,286
Metal:					
Pig iron ____ do ____	7,337	7,811	6,963	6,800	5,956
Ferroalloys:[2]					
Ferromanganese, high-carbon ____	95,393	86,875	94,146	e85,500	e84,500
Ferrosilicon ____	18,943	18,990	18,435	e18,500	e17,900
Silicomanganese ____	--	19,596	18,376	e19,000	e17,800
Total ____	114,336	125,461	130,957	e123,000	e120,200
Crude steel ____ thousand tons ____	7,589	8,125	r7,593	7,635	6,370
Semimanufactures ____ do ____	6,975	7,043	5,513	5,500	5,100
Lead:					
Mine output, metal content ____	400,291	421,581	397,491	388,642	456,941
Metal:					
Primary:					
Bullion, for export ____	151,964	r169,469	r160,286	161,592	170,000
Refined ____	204,022	r215,734	r200,454	207,668	218,801
Total ____	355,986	r385,203	r360,740	369,260	388,801
Secondary (excluding remelt)[e] ____	35,100	42,000	r33,200	31,500	28,300
Manganese ore:					
Gross weight ____ thousand tons ____	1,249	r1,724	r2,020	1,449	1,132
Manganese content ____ do ____	608	r827	r963	695	543
Mercury ____ 76-pound flasks ____	--	2	2	--	--
Nickel:					
Mine output, metal content ____	82,359	69,709	74,323	74,355	88,553
Metal, smelter (refined metal and metal content of oxide) ____	37,327	39,341	35,309	42,505	45,900
Platinum-group metals:[3]					
Palladium, metal content ____ troy ounces ____	7,395	6,880	10,545	12,892	9,200
Platinum, metal content ____ do ____	2,958	2,765	2,058	2,090	1,820
Ruthenium ____ do ____	e300	e200	150	150	150
Total ____ do ____	10,653	9,845	12,753	15,132	11,170
Rare-earth metals, monazite concentrate:					
Gross weight ____	14,992	16,340	14,079	13,251	9,433
Monazite content ____	13,938	15,139	13,075	12,314	8,769

See footnotes at end of table.

Table 1.—Australia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS —Continued					
Silver:					
Mine output, metal content thousand troy ounces	26,123	26,756	25,375	23,896	28,933
Metal, refined do	9,599	9,469	9,761	10,776	10,071
Tin:					
Mine output, metal content	11,864	12,571	11,588	12,049	12,203
Metal, refined:					
Primary	5,129	5,423	r4,819	4,215	3,105
Secondary	320	485	e490	485	e400
Titanium concentrates, gross weight:					
Ilmenite thousand tons	1,255	1,150	1,309	1,317	1,158
Leucoxene	16,104	21,773	23,943	19,647	20,138
Rutile	257,075	278,901	293,748	239,251	220,757
Tungsten: Mine output, metal content	2,707	3,193	3,575	3,517	2,588
Uranium: Mine output, metal content	516	706	1,516	2,922	4,453
Vanadium: Mine output, metal content	--	--	--	85	85
Zinc:					
Mine output, metal content	473,293	529,157	r495,312	518,297	665,017
Metal, smelter:					
Dust	7,343	7,763	e8,000	e8,000	e8,000
Primary	290,066	305,394	r300,959	295,852	290,569
Secondary[e]	4,700	4,700	4,800	4,500	4,500
Zirconium concentrates, gross weight	391,606	444,975	491,547	434,246	452,765
NONMETALS					
Abrasives, natural:					
Beach pebble	1,578	1,568	2,200	e2,250	e2,300
Garnet (sales)	1,583	1,080	r925	763	800
Asbestos	62,744	79,721	92,418	44,647	45,000
Barite[4]	13,790	94,066	38,633	41,140	40,000
Cement, hydraulic thousand tons	4,993	5,243	5,387	6,007	5,744
Clays:					
Bentonite and bentonitic clay	4,656	6,626	10,988	r e11,000	e11,000
Brick clay and shale thousand tons	8,563	8,050	9,429	9,571	8,839
Cement clay and shale do	436	275	380	r e450	e450
Damourite clay (sales)	1,505	2,606	3,194	r e3,200	e3,300
Fire clay thousand tons	356	459	490	e305	e320
Fuller's earth	68	e50	e50	e50	e50
Kaolin and ball clay	89,200	145,326	219,070	220,000	e225,000
Other[5] thousand tons	509	2,650	r1,840	1,930	e2,000
Diatomite	2,821	3,529	r3,010	1,305	e1,500
Diamond: Industrial thousand carats	--	--	48	50	557
Feldspar	3,185	3,869	r3,648	4,008	e4,000
Gem stones value, thousands	$86,257	$89,349	$98,155	r e$110,000	e$110,000
Gypsum thousand tons	940	1,230	r1,309	1,721	1,800
Lime[6]	890,032	1,089,000	1,200,000	1,300,000	1,225,000
Magnesite	21,350	29,301	r32,198	26,887	28,200
Nitrogen: N content of ammonia	294,300	308,300	353,000	355,000	e360,000
Perlite, crude	1,417	2,063	2,249	e2,500	2,500
Phosphate rock	248,328	7,557	6,621	4,937	235,000
Pigments, mineral, natural: Ocher	281	222	53	75	80
Pyrites including cuprous, gross weight	204,724	44,910	--	--	--
Salt thousand tons	5,766	5,171	5,665	6,420	6,100
Sillimanite	568	568	661	331	400
Sodium carbonate[e]	165,000	165,000	185,000	190,000	180,000
Stone, sand and gravel:					
Construction sand[5] thousand tons	23,264	24,290	25,694	e26,000	e27,000
Gravel[5] do	14,176	16,005	15,667	r e16,000	17,000
Dolomite do	638	747	r843	850	900
Limestone:					
For cement do	7,693	7,872	8,132	r e8,100	e8,200
For other uses do	3,232	3,579	3,598	r e3,600	e3,650
Silica in the form of quartz, quartzite, glass sand do	1,290	1,068	1,361	r e1,400	e1,420
Other:					
Crushed and broken stone do	56,910	56,498	57,737	r e58,000	e59,000
Dimension stone[7] do	115	122	116	r e150	e175
Unspecified[8] do	28,905	r30,775	35,299	r e36,000	e36,500
Sulfur:					
S content of pyrites	92,714	r29,066	--	--	--
Byproduct:					
Metallurgy	140,000	140,000	140,000	130,000	130,000
Petroleum	10,130	15,501	r12,791	e13,000	e13,500
Total	242,844	r184,567	r152,791	133,000	143,500
Talc, soapstone, pyrophyllite	146,954	157,475	170,964	90,283	93,000

See footnotes at end of table.

Table 1.—Australia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous and subbituminous thousand tons	79,827	83,160	84,625	111,700	118,700
Lignite do	32,860	32,597	32,895	32,963	37,813
Total do	112,687	115,757	117,520	144,663	156,513
Coke:					
Metallurgical do	5,103	[r]5,375	[r]5,023	4,403	3,761
Gashouse (including breeze) do	65	70	[e]80	[e]80	[e]80
Total do	5,168	[r]5,445	[r]5,103	4,483	3,841
Fuel briquets do	1,129	1,157	1,230	1,008	854
Gas, natural, marketed million cubic feet	258,511	296,006	337,995	400,648	409,439
Natural gas liquids[9] thousand 42-gallon barrels	17,940	18,650	18,172	18,699	18,255
Peat	6,424	14,248	12,211	13,200	13,500
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	158,421	159,560	139,885	135,143	136,251
Refinery products:					
Gasoline:					
Aviation do	352	428	730	92,922	96,400
Motor do	86,957	88,183	88,885		
Jet fuel do	13,932	14,586	14,040	15,136	15,470
Kerosine do	1,635	1,654	1,891	2,984	1,110
Distillate fuel oil do	57,011	59,010	53,257	51,899	54,210
Residual fuel oil do	28,738	28,964	22,258	21,732	20,933
Lubricants do	3,717	3,717	3,638	34,809	3,688
Other:					
Refinery gas[10] do	667	377	NA	NA	NA
Liquefied petroleum gas do	4,132	4,038	3,828	3,816	4,714
Solvents do	1,377	1,384	1,138	616	NA
Bitumen do	3,013	3,283	3,044	2,875	3,260
Unspecified do	6,768	5,522	7,222	7,365	7,566
Refinery fuel and losses do	18,103	20,633	14,274	15,000	15,000
Total do	226,402	231,779	[11]227,274	[11]230,000	[11]223,552

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through Sept. 27, 1983.

[2]Data are for years ending Nov. 30 of that stated for plants owned by The Broken Hill Pty. Co. Ltd.

[3]Western Australia only. Metal content of nickel ore.

[4]Beginning with 1979, production from Western Australia and Northern Territory is included.

[5]Excludes production from Western Australia.

[6]Data are for years ending June 30 of that stated.

[7]Excludes production from Northern Territory and Australian Capital Territory.

[8]Excludes production from Northern Territory, Australian Capital Territory, and Western Australia.

[9]Excludes natural gasoline and liquefied petroleum gas, which are produced on Barrow Island, off the Western Australia coast. An unspecified portion of the liquefied petroleum gas extracted is apparently marketed locally, but this quantity is limited. The bulk of the liquefied petroleum gas and all of the natural gasoline is blended with crude oil and presumably is counted with crude oil from that area. Gross production of liquefied petroleum gas on Barrow Island was as follows, in thousand barrels: 1980—23; 1981-82—not available; of natural gasoline: 1978—33; 1979—31; 1980—26; 1981-82—not available. Natural gas liquid output from several gasfields in Western Australia is excluded for similar reasons. Condensate production from these fields was as follows, in thousand barrels: 1978—19; 1979—20; 1980—22; 1981-82—not available.

[10]Residual fuel oil equivalent.

[11]Reported figure; detail may not add to totals shown.

TRADE

Although a major producer of a wide range of minerals, Australia is relatively unimportant as a consumer, and much of its production was strongly export oriented. Australia's mineral trade was adversely affected by reduced demand and lower prices for some commodities in 1982, but the value of exports established a new record of $8.1 billion. The principal contributors were coal, iron ore, and the aluminum group, which were responsible for about two-thirds of the total mineral export revenue. In particular, exports of black coal contributed a record export value of about $2.6 billion in 1982.

The value of mineral imports was $3.1 billion, compared with $2.4 billion in 1981. As in previous years, imports of crude oil and other refinery feedstock were by far the largest single category, accounting for about 87% of mineral imports.

Table 2.—Australia: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides thousand tons	(1)	[2]6,509	NA	NA.
Metal including alloys:				
Scrap	15,784	14,162	301	Japan 11,129; Republic of South Africa 885; India 504.
Unwrought	44,954	79,191	NA	NA.
Semimanufactures	20,444	26,487	42	Singapore 813; New Zealand 713; Papua New Guinea 363.
Chromium: Ore and concentrate	142	2	--	All to Singapore.
Copper:				
Ore and concentrate	164,304	116,499	3,494	Japan 111,257; Belgium-Luxembourg 674; United Kingdom 577.
Matte and speiss including cement copper	5,797	3,526	--	Netherlands 2,904; West Germany 622.
Metal including alloys:				
Scrap	1,026	483	12	India 275; Indonesia 91; Republic of Korea 18.
Unwrought[3]	18,100	18,773	2,358	Japan 13,469; West Germany 2,581; New Zealand 365.
Semimanufactures[3]	2,619	2,443	22	New Zealand 588; Philippines 255; Bahrain 196.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	80,068	71,202	--	Japan 53,869; Republic of Korea 4,353; West Germany 2,960.
Metal:				
Scrap	(4)	642,362	--	Hong Kong 7,794; Republic of Korea 7,295; Indonesia 4,957.
Pig iron, cast iron, related materials	545,270	158,460	--	Japan 47,717; Singapore 25,225; Bangladesh 18,593.
Ferroalloys:				
Ferromanganese	23,223	16,424	5,870	Indonesia 4,427; Qatar 3,000; Thailand 2,050.
Unspecified	6,727	23,298	10,963	Japan 4,200; Singapore 3,105; Thailand 1,873.
Steel, primary forms	554,798	698,627	12,440	Republic of Korea 116,973; Hong Kong 109,961; Philippines 95,413.
Semimanufactures:				
Bars, rods, angles, shapes, sections	207,931	150,150	2	China 37,715; Ecuador 16,207; Singapore 14,036.
Universals, plates, sheets	107,306	195,939	44,152	New Zealand 53,142; Thailand 25,054; United Kingdom 11,422.
Hoop and strip	50,971	22,482	1,087	New Zealand 8,091; Canada 6,265; Indonesia 4,362.
Rails and accessories	18,276	1,432	--	New Zealand 1,006; Fiji 313; Indonesia 87.
Wire[3]	7,114	5,414	325	New Zealand 3,077; Hong Kong 1,250; Malaysia 321.
Tubes, pipes, fittings[3]	1,555	42,140	(5)	Republic of Korea 303; Papua New Guinea 242; Fiji 178.
Castings and forgings, rough	3,512	6,677	3,317	Singapore 1,903; Papua New Guinea 392; Indonesia 273.
Lead:				
Ore and concentrate	73,327	61,540	7,585	United Kingdom 20,817; Belgium-Luxembourg 18,484; Japan 10,201.
Oxides	5,747	3,800	--	China 1,377; Indonesia 384; Malaysia 361.
Metal including alloys:				
Scrap	10,016	5,332	13	Japan 976; India 632; Republic of Korea 52.
Unwrought value	$530,057	$308,744	$8,291	United Kingdom $193,262; India $18,672; Italy $14,912.
Semimanufactures	1,221	11,029	--	Iran 4,003; Japan 3,065; India 1,746.
Manganese: Ore and concentrate thousand tons	1,328	1,342	83	Japan 433; Republic of Korea 148; West Germany 114; United Kingdom 44.
Nickel:				
Matte and speiss value, thousands	$199,109	$299,998	NA	NA.
Metal including alloys:				
Scrap	145	175	(5)	West Germany 79; India 44; United Kingdom 25.
Unwrought value, thousands	$60,301	$146,154	NA	NA.
Semimanufactures do.	$1,002	$2,509	NA	NA.

See footnotes at end of table.

Table 2.—Australia: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,572	$1,092	$19	United Kingdom $744; Hong Kong $125; New Zealand $98.
Silver:				
Ore and concentrate do	$5,377	$1,210	$1,117	United Kingdom $84.
Waste and sweepings do	$1,345	$855	$31	United Kingdom $444; New Zealand $174; West Germany $113.
Metal including alloys, unwrought and partly wrought do	$104,675	$56,483	$7	Japan $35,575; United Kingdom $13,364; New Zealand $5,070.
Tin:				
Ore and concentrate	37,942	14,849	--	Malaysia 14,224; West Germany 473; Singapore 81.
Metal including alloys:				
Scrap	203	798	359	United Kingdom 166; Malaysia 150; Japan 86.
Unwrought	1,597	1,410	423	Netherlands 332; New Zealand 154; Malaysia 137.
Semimanufactures	787	693	222	Papua New Guinea 127; United Kingdom 68; Saudi Arabia 61.
Titanium: Ore and concentrate thousand tons	1,398	1,123	339	United Kingdom 211; Spain 88; U.S.S.R. 84; Brazil 69.
Tungsten:				
Ore and concentrate	6,113	6,347	237	West Germany 3,514; Sweden 1,108; Singapore 339.
Metal including alloys, all forms value, thousands	$1,106	$125	--	New Zealand $87; Papua New Guinea $15; Singapore $11.
Uranium and/or thorium:				
Ore and concentrate do	$114,217	$144,245	$43,027	France $52,888; Canada $42,999; United Kingdom $5,318.
Metal including alloys, all forms, uranium and thorium do	--	$3	--	All to New Zealand.
Zinc:				
Ore and concentrate	534,390	458,857	--	Japan 262,026; Republic of Korea 66,352; United Kingdom 66,067.
Oxides	188	120	--	Philippines 49; Papua New Guinea 44.
Metal including alloys:				
Scrap	931	1,111	(5)	India 534; Republic of Korea 362; Indonesia 88.
Unwrought	(6)	194,678	27,827	Indonesia 52,575; Thailand 26,507; Hong Kong 22,441.
Semimanufactures	5,509	5,923	73	France 3,982; New Zealand 523; Indonesia 491.
Other:				
Ores and concentrates	668	71,159	--	Belgium-Luxembourg 1,058; France 100.
Ashes and residues value, thousands	$30,492	$17,512	$4,715	Belgium-Luxembourg $5,730; United Kingdom $1,700; India $1,522.
Base metals including alloys, all forms do	$6,113	$6,870	$2,997	Singapore $962; Japan $797; France $438.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc do	$1,681	$3,480	$5	Thailand $3,426.
Artificial: Corundum	16	58	--	New Zealand 54.
Dust and powder of precious and semi-precious stones excluding diamond value, thousands	$54	$191	$6	Ireland $90; New Zealand $68.
Grinding and polishing wheels and stones do	$746	$826	$2	New Zealand $320; Thailand $188; Papua New Guinea $88.
Asbestos, crude	51,901	39,261	--	Thailand 8,010; India 7,565; Japan 7,362.
Barite and witherite value, thousands	$1,925	$257	--	New Zealand $160; Republic of South Africa $50; Egypt $31.

See footnotes at end of table.

Table 2.—Australia: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Cement	282,705	197,214	75,500	Bahrain 99,177; Papua New Guinea 13,537; Indonesia 6,252.
Clays and clay products:				
Crude, unspecified	134	3,170	43	Japan 1,539; United Kingdom 596; New Zealand 329.
Products:				
Nonrefractory value, thousands	$834	$1,524	$13	Singapore $553; Papua New Guinea $334; Malaysia $155.
Refractory including nonclay brick do	$5,057	$4,585	$9	New Zealand $1,953; Philippines $1,038; Indonesia $517.
Diamond:				
Gem, not set or strung do	$26,574	$23,714	$1,771	United Kingdom $4,557; Papua New Guinea $3,312; Belgium-Luxembourg $2,994.
Industrial do	$5,673	$4,917	$703	Ireland $2,547; United Kingdom $791; Canada $302.
Diatomite and other infusorial earth do	$27	$103	--	New Zealand $67; Philippines $12; Papua New Guinea $11.
Feldspar, fluorspar, related materials[8]	593	1,332	--	Japan 1,165; New Zealand 135; Singapore 25.
Fertilizer materials:				
Crude, n.e.s	1,677	1,580	1	Philippines 649; Japan 101.
Manufactured:				
Ammonia value, thousands	$373	$527	--	New Zealand $484.
Nitrogenous	22,206	20,921	--	New Zealand 16,832; Fiji 1,432; Papua New Guinea 1,145.
Phosphatic	2,525	778	--	Philippines 404; Papua New Guinea 267; New Caledonia 54.
Potassic	10	[9]25	([5])	Papua New Guinea 11; Thailand 6; New Zealand 3.
Unspecified and mixed	3,072	1,370	--	Papua New Guinea 831; New Zealand 400; Fiji 110.
Graphite, natural	30	40	--	New Zealand 38.
Gypsum and plaster	391,219	620,807	--	Indonesia 173,175; Japan 139,962; New Zealand 104,592.
Lime	2,209	2,529	--	Indonesia 2,510.
Magnesium compounds: Magnesite	4,632	2,738	--	New Zealand 2,416; Philippines 216.
Mica: Worked including agglomerated splittings value, thousands	$135	$139	--	Papua New Guinea $74; New Zealand $36; Indonesia $15.
Nitrates, crude	9	--		
Phosphates, crude	117	3	--	Christmas Island 2.
Pigments, mineral: Iron oxides and hydroxides, processed	166	351	96	New Zealand 120; Papua New Guinea 22; Malaysia 19.
Potassium salts, crude	16	--		
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$47,464	$53,732	$9,198	Thailand $12,264; Hong Kong $12,008; Japan $7,771.
Salt and brine do	$49,866	$50,400	--	Japan $34,769; Republic of Korea $7,510; Papua New Guinea $625.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	10	5	--	Papua New Guinea 4.
Sodium hydroxide value, thousands	$1,603	$1,581	--	New Zealand $1,098; Philippines $398.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,137	241	110	New Zealand 54; Singapore 38; Papua New Guinea 22.
Worked value, thousands	$16	$106	--	Singapore $53; Papua New Guinea $23; Malaysia $17.
Gravel and crushed rock	654,075	384,271	46,037	Japan 243,861; Republic of Korea 81,623; Papua New Guinea 9,931.
Limestone other than dimension	387	--		
Sulfur:				
Elemental, crude including native and byproduct value, thousands	$143	$202	--	New Zealand $82; Malaysia $48; Indonesia $33.
Sulfuric acid	147	255	--	Papua New Guinea 56; Singapore 54; New Zealand 49.

See footnotes at end of table.

Table 2.—Australia: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Talc, steatite, soapstone, pyrophyllite	83,059	82,642	--	Japan 60,406; United Kingdom 6,253; Netherlands 6,213.
Other:				
Crude value, thousands	$1,524	$652	$1	New Zealand $256; Japan $93; Papua New Guinea $88.
Slag and dross, not metal-bearing do	$24	$1,292	--	Malaysia $1,282.
Oxides and hydroxides of barium, magnesium, strontium	2	12	--	Indonesia 8; Fiji 2; New Zealand 2.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value, thousands	$20,697	$4,332	--	Canada $1,977; Papua New Guinea $1,056; Japan $540.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black and gas carbon	43,423	44,612	--	Indonesia 16,759; India 10,578; New Zealand 6,899.
Coal:				
Anthracite and bituminous thousand tons	42,422	50,569	15	Japan 34,507; Republic of Korea 3,517; United Kingdom 2,251.
Lignite including briquets	148,859	39,775	272	Japan 22,459; Republic of Korea 16,500.
Coke and semicoke value, thousands	$7,729	$6,188	--	Norway $2,583; Japan $1,606; New Caledonia $1,141.
Petroleum refinery products:				
Gasoline thousand 42-gallon barrels	1,994	3,298	--	New Zealand 2,355; Singapore 375; Fiji 335.
Mineral jelly and wax do	77	9	--	Malaysia 3; New Zealand 3.
Kerosine and jet fuel do	2,784	2,511	--	New Zealand 1,594; Fiji 625; Indonesia 233.
Distillate fuel oil do	4,709	5,785	--	Indonesia 2,428; Fiji 1,109; Papua New Guinea 725.
Lubricants value, thousands	$87,271	$85,336	$7,554	New Zealand $14,560; Indonesia $11,415; Papua New Guinea $8,285.
Residual fuel oil thousand 42-gallon barrels	1,622	2,569	457	Singapore 1,181; Japan 452; New Zealand 126.
Bitumen and other residues value, thousands	$183	$55	--	New Zealand $15; New Caledonia $12; Tonga $9.
Bituminous mixtures do	$696	$758	$98	Singapore $204; New Zealand $104; Tonga $69.
Tars and other crude chemicals derived from coal, gas, and petroleum	[10]7	40,298	--	New Zealand 13,986; Canada 12,519; United Arab Emirates 9,273.

NA Not available.
[1]Unreported quantity valued at $1,146,735,000.
[2]Excludes unreported quantity valued at $2,000.
[3]Totals are incomplete owing to a lack of reported detailed data.
[4]Unreported quantity valued at $57,181,000.
[5]Less than 1/2 unit.
[6]Unreported quantity valued at $145,575,000.
[7]Excludes unreported quantity valued at $326,000.
[8]May include mica and quartz.
[9]Excludes unreported quantity valued at $4,000.
[10]Excludes unreported quantity valued at $8,054,000.

Table 3.—Australia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Rare-earth metals	114	149	4	Canada 62; United Kingdom 56.
Aluminum:				
Ore and concentrate	11,088	12,801	(1)	China 9,702; Trinidad and Tobago 3,080.
Oxides and hydroxides	7,390	6,956	1,717	Japan 2,628; China 1,598; United Kingdom 362.
Metal including alloys:				
Scrap	3,473	3,012	1	New Zealand 2,367; Hong Kong 406; Papua New Guinea 110.
Unwrought	8,972	9,261	1,907	Canada 3,311; Bahrain 1,897; China 898.
Semimanufactures	11,638	15,521	3,229	Japan 7,975; New Zealand 1,389; United Kingdom 1,386.
Beryllium: Metal including alloys, all forms value, thousands	$19	$18	$5	United Kingdom $13.
Chromium:				
Ore and concentrate	15,476	7,997	--	Philippines 5,700; Republic of South Africa 2,297.
Oxides and hydroxides	1,317	641	163	West Germany 308; Japan 95; U.S.S.R. 51.
Cobalt: Oxides and hydroxides	11	39	7	United Kingdom 27.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$53	$51	$8	Netherlands $25; Japan $9.
Copper:				
Ore and concentrate	93	10,006	(1)	Mainly from Papua New Guinea.
Matte and speiss including cement copper	--	188	--	All from Papua New Guinea.
Metal including alloys:				
Scrap	24,186	13,778	--	New Zealand 13,132.
Unwrought	262	2,158	29	Mexico 2,000.
Semimanufactures[2]	800	54,834	260	Japan 53,516.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	14,888	27,932	3	Canada 27,913.
Pyrite, roasted	19	12	--	Netherlands 11.
Metal:				
Scrap	1,247	673	1	Papua New Guinea 542; Singapore 58; New Zealand 18.
Pig iron, cast iron, related materials	9,682	56,422	1,008	India 25,860; Brazil 17,500.
Ferroalloys:				
Ferromanganese	7,204	3,896	18	Republic of South Africa 2,778; Japan 950.
Unspecified thousand tons	35	5,006	19	Republic of South Africa 4,981.
Steel, primary forms	36,367	1,830	11	Japan 867; Philippines 511; West Germany 222.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	29,518	95,108	66,366	Japan 16,568; United Kingdom 11,202.
Universals, plates, sheets[2]	169,628	210,049	1,128	Japan 159,169; Republic of Korea 40,168.
Hoop and strip	22,092	[3]9,758	908	Japan 5,755; United Kingdom 2,128; Sweden 433.
Rails and accessories	7,033	12,227	82	Japan 12,089.
Wire value, thousands	$19,932	$16,385	$918	Japan $8,507; Sweden $1,170; New Zealand $1,020.
Tubes, pipes, fittings[2]	147,508	22	20	United Kingdom 2.
Castings and forgings, rough	491	1,027	25	Philippines 255; China 175.
Lead:				
Ore and concentrate	5,000	25,130	--	Republic of South Africa 14,197; Bolivia 5,929; Argentina 5,001.
Oxides	128	232	5	Mexico 58; Netherlands 54; China 52; Republic of South Africa 31.
Metal including alloys:				
Scrap	1,607	391	--	Fiji 156; New Zealand 128; New Caledonia 72.
Unwrought	363	10	NA	New Caledonia 7; China 2.
Semimanufactures	114	111	33	United Kingdom 65.
Magnesium: Metal including alloys:				
Scrap	16	405	300	Norway 100.
Unwrought	2,923	2,312	897	Norway 1,307.
Semimanufactures value, thousands	$1,642	$1,923	$598	Norway $385; Canada $344; United Kingdom $249.

See footnotes at end of table.

Table 3.—Australia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate	2,423	2,138	--	Gabon 2,039.
Oxides	1,792	1,195	203	Japan 984.
Mercury 76-pound flasks	1,131	1,682	NA	China 783; New Zealand 377; Spain 232.
Metalloids, unspecified	6,233	6,843	166	Republic of South Africa 3,255; Canada 1,728; Norway 572.
Molybdenum: Metal including alloys, all forms value, thousands	$1,891	$799	$131	Canada $319; France $164; Austria $121.
Nickel:				
Ore and concentrate	703	(1)	NA	NA.
Matte and speiss	1,890	--		
Metal including alloys:				
Scrap	23	66	--	United Kingdom 35; Republic of South Africa 17; New Zealand 14.
Unwrought value, thousands	$11,233	$9,701	$43	Canada $9,140.
Semimanufactures[2]	2,404	924	84	West Germany 661; United Kingdom 122.
Platinum-group metals: Metal including alloys, unwrought and partly wrought value, thousands	$5,269	$3,674	$666	United Kingdom $1,509; Switzerland $899; West Germany $244.
Silver:				
Ore and concentrate troy ounces	48,740	--		
Waste and sweepings value, thousands	$4,742	$1,203	--	Singapore $813; New Zealand $265; Hong Kong $50.
Metal including alloys, unwrought and partly wrought do	$8,397	$1,809	$124	United Kingdom $1,092; Hong Kong $161; New Zealand $105.
Tin:				
Ore and concentrate	--	2	--	All from Republic of South Africa.
Metal including alloys:				
Scrap	17,271	32,335	82	Singapore 28,247; Hong Kong 4,000.
Unwrought	154	2,316	--	China 2,149.
Semimanufactures	20	37	3	France 18; United Kingdom 7; Malaysia 5.
Titanium: Oxides	974	1,004	556	United Kingdom 342; Poland 69.
Tungsten: Metal including alloys, all forms value, thousands	$596	$667	$328	United Kingdom $166; West Germany $71; Japan $33.
Uranium and/or thorium:				
Ore and concentrate do	$24	--		
Metal including alloys, all forms do	$28	--		
Zinc:				
Ore and concentrate	2	2	2	
Oxides	691	808	257	Canada 179; Singapore 158; West Germany 137.
Metal including alloys:				
Scrap	48	467	--	New Zealand 464.
Unwrought value, thousands	$3	$15	--	Belgium-Luxembourg $13.
Semimanufactures	223	783	40	Republic of Korea 255; United Kingdom 176; West Germany 155.
Other:				
Ores and concentrates	7,833	1,494	36	Republic of South Africa 1,050; New Zealand 152; Canada 100.
Oxides and hydroxides	1,216	1,429	242	Japan 489; United Kingdom 268.
Ashes and residues	945	823	--	New Zealand 505; Japan 202.
Base metals including alloys, all forms value, thousands	$11,864	$9,827	$3,466	Republic of South Africa $2,363; United Kingdom $1,613; Japan $582.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	951	924	414	Japan 235; New Zealand 163; Italy 50.
Artificial: Corundum	3,874	3,867	393	Japan 1,376; France 979; West Germany 693.
Dust and powder of precious and semiprecious stones value, thousands	$2,253	$2,611	$1,553	Ireland $976; United Kingdom $55; Republic of South Africa $23.
Grinding and polishing wheels and stones	1,399	2,474	105	West Germany 1,054; Netherlands 284; Japan 279.
Asbestos, crude	25,219	20,960	16	Canada 18,342; Republic of South Africa 2,493.

See footnotes at end of table.

Table 3.—Australia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Barite and witherite value, thousands	$194	$140	$32	China $77.
Boron materials:				
Crude natural borates	2	94	93	United Kingdom 1.
Oxides and acids	1,893	2,740	2,475	China 225.
Cement value, thousands	$6,416	$5,355	$831	Japan $1,664; United Kingdom $1,113.
Chalk	3,928	3,969	5	United Kingdom 3,155; New Zealand 532; France 277.
Clays and clay products:				
Crude, unspecified	105,061	108,648	90,346	Republic of South Africa 16,201; United Kingdom 1,114.
Products:				
Nonrefractory value, thousands	$76,819	$79,170	$376	Italy $41,982; Japan $24,987.
Refractory including nonclay brick[2]	42,330	32,148	2,212	Japan 13,816; Republic of South Africa 7,639; Austria 3,587.
Cryolite and chiolite	108	194	--	Denmark 151; Japan 43.
Diamond:				
Gem, not set or strung value, thousands	$56,648	$43,990	$1,831	Israel $16,609; Belgium-Luxembourg $9,602; India $8,664.
Industrial do	$8,313	$6,466	$257	Ireland $3,228; Republic of South Africa $2,202.
Diatomite and other infusorial earth	7,413	7,347	6,731	Philippines 480; United Kingdom 63.
Feldspar, fluorspar, related materials	61,548	37,779	532	China 17,721; Canada 10,877; Thailand 4,396.
Fertilizer materials: Manufactured:				
Ammonia value, thousands	$1,154	$19	$18	United Kingdom $1.
Nitrogenous	70,357	104,487	86,233	Qatar 9,318; Canada 6,975.
Phosphatic	21	95	--	United Kingdom 83.
Potassic	239,824	205,113	51,141	Canada 151,793; West Germany 1,347.
Unspecified and mixed	32,315	71,577	57,252	Canada 8,446; West Germany 2,089; Belgium-Luxembourg 1,754.
Graphite, natural	1,817	1,459	14	China 566; Republic of Korea 364; United Kingdom 186.
Gypsum and plaster	1,713	1,559	582	United Kingdom 526; West Germany 177; Japan 120.
Halogens:				
Chlorine value, thousands	$17	$16	$15	NA.
Unspecified	46	33	13	Japan 16.
Lime value, thousands	$538	$407	$30	Japan $334.
Magnesium compounds: Magnesite	17,863	21,837	5,106	Japan 16,559.
Mica:				
Crude including splittings and waste	959	805	21	China 405; India 316.
Worked including agglomerated splittings value, thousands	$882	$776	$359	United Kingdom $156; West Germany $121; Switzerland $79.
Nitrates, crude	670	1,342	54	Belgium-Luxembourg 1,288.
Phosphates, crude thousand tons	(3)	1,962	175	Nauru 1,017; Christmas Island 740.
Pigments, mineral: Iron oxides and hydroxides, processed	10,759	10,987	339	West Germany 9,465; Spain 670; United Kingdom 338.
Potassium salts, crude	--	360	360	
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$13,645	$19,193	$1,184	Thailand $8,336; Hong Kong $1,569; Sri Lanka $1,345.
Synthetic do	$615	$645	$30	Austria $153; Switzerland $150; West Germany $102.
Pyrite, unroasted	18	24	15	West Germany 6.
Salt and brine value, thousands	$733	$775	$25	New Zealand $323; United Kingdom $296; Mexico $47.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	3,265	2,877	38	United Kingdom 1,154; Japan 1,020; India 357.
Sodium carbonate, natural and manufactured	10,506	2,643	2,495	Japan 144.
Sodium hydroxide value, thousands	$46,121	$131,875	$26	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	19,542	23,729	--	Republic of South Africa 11,217; India 5,953; Italy 3,027.
Worked value, thousands	$4,593	$4,881	$45	Italy $2,212; Spain $209.

See footnotes at end of table.

Table 3.—Australia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Dolomite, chiefly refractory-grade	34	67	--	United Kingdom 54.
Gravel and crushed rock	133,872	69,018	147	Japan 68,030; New Zealand 351; Italy 338.
Limestone other than dimension thousand tons	1,077	1,323	(1)	Japan 1,275; Philippines 48.
Quartz and quartzite	199	569	208	West Germany 124; Finland 103; Sweden 57.
Sand other than metal-bearing	1,225	2,307	1,439	Republic of South Africa 533; Sweden 154.
Sulfur:				
Elemental:				
Crude including native and by-product value, thousands	$51,557	$49,172	$524	Canada $48,640.
Colloidal, precipitated, sublimed	273	217	2	France 95; Yugoslavia 85; West Germany 35.
Sulfuric acid	14,223	11,569	2	Japan 11,565.
Talc, steatite, soapstone, pyrophyllite	381	329	228	Norway 60; Italy 19; Canada 18.
Other:				
Crude	4,308	5,917	182	Republic of South Africa 2,700; China 895; Austria 817.
Slag and dross, not metal-bearing	1,524	1,085	8	United Kingdom 648; New Zealand 228; Singapore 70.
Oxides and hydroxides of barium, magnesium, strontium	3,370	2,379	2,258	Italy 45; West Germany 19; United Kingdom 18.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value, thousands	$1,060	$3,519	$2,526	Spain $392; United Kingdom $373.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	822	540	462	West Germany 41; Trinidad and Tobago 35.
Carbon: Carbon black	901	1,209	440	United Kingdom 471; West Germany 131.
Coal:				
Anthracite and bituminous	2,159	116,695	737	Japan 115,343; Republic of South Africa 613.
Lignite including briquets	40	14	13	NA.
Coke and semicoke value, thousands	$1,431	$4,985	$598	Japan $4,383.
Peat including briquets and litter do	$1,481	$1,230	--	West Germany $879; New Zealand $194.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	54,025	53,187	(1)	Saudi Arabia 30,884; Indonesia 10,505; United Arab Emirates 6,019.
Refinery products:				
Liquefied petroleum gas do	1	13	(1)	Mainly from Saudi Arabia.
Gasoline, motor do	4,137	4,087	37	Bahrain 1,545; Singapore 1,072; Romania 714.
Mineral jelly and wax do	48	56	15	Japan 19; China 7; Republic of South Africa 6.
Kerosine and jet fuel do	1,254	953	39	Singapore 772; Bahrain 122.
Distillate fuel oil do	4,379	3,615	(1)	Singapore 3,004; Bahrain 437.
Lubricants value, thousands	$42,772	$36,704	$17,630	Netherlands Antilles $6,879; United Kingdom $6,480; West Germany $2,164.
Residual fuel oil thousand 42-gallon barrels	27,987	9,085	(1)	Kuwait 4,074; Singapore 1,776; Saudi Arabia 1,477.
Bitumen and other residues value, thousands	$474	$1,176	$20	Mainly from Singapore.
Bituminous mixtures do	$1,314	$1,984	$927	Japan $518; Canada $241; United Kingdom $240.
Petroleum coke thousand 42-gallon barrels	745	843	689	Canada 154.
Tars and other crude chemicals derived from coal, gas, and petroleum[2]	283	255	37	United Kingdom 201.

NA Not available.
[1]Less than 1/2 unit.
[2]Totals are incomplete owing to a lack of reported detailed data.
[3]Unreported quantity valued at $125,540,000.

COMMODITY REVIEW

METALS

Aluminum, Alumina, and Bauxite.—The Australian aluminum industry declined in all categories during 1982. Production of bauxite declined about 8% from the 1981 level as a result of a lengthy industrial dispute at the Weipa Mine as well as a decline in market demand. Alumina output fell about 6% owing to weaker world markets. The decline in bauxite and alumina output in Australia marked the third successive annual decline of these two products since the record year of 1979. Despite the installation of new smelter capacity, aluminum metal production dropped about 5% below the 1981 level. During 1982, Alcoa of Australia Ltd. deferred construction on its Portland, Victoria, smelter project, and The Broken Hill Pty. Co. Ltd. (BHP) dropped plans to build a smelter at Lochinvar, in New South Wales. However, the Boyne smelter in Queensland was commissioned, and construction proceeded on schedule on the Tamago smelter project in New South Wales.

The decline in alumina production was attributed to a drop in demand in the world alumina market. Alcoa's alumina refineries at Pinjarra and Kwinana, located in Western Australia, operated at 85% capacity during most of 1982. The company's newly completed Wagerup refinery remained on care-and-maintenance throughout the year. In midyear, Queensland Alumina Ltd. (QAL) reduced the operating rate of its Gladstone refinery to 85% of the rated annual capacity by closing down one of the three digestion units. However, QAL began expanding its rated annual capacity from 2.03 million to 2.33 million tons.

Production declined at Weipa where Comalco Pty. Ltd. produces about 15% of the Western World's total bauxite output. Comalco is owned 45% by Conzinc Riotinto of Australia Ltd. (CRA), 45% by Kaiser Aluminum and Chemical Corp., and 10% by the Australian public. In October 1982, CRA and AMP Society Ltd. acquired Kaiser's 45% share in Comalco for $361.6 million. As a result, CRA increased its share in Comalco by 30%, and AMP Society increased its share by 15%. Comalco produced and shipped about 7.2 million tons of bauxite, mainly to the alumina refinery operated by QAL at Gladstone. All of Alcoa's bauxite output was converted to alumina at its nearby refineries. At Gove, located in the Northern Territory, Nabalco Pty. Ltd. refined about 2.5 million tons of bauxite, roughly one-half of its output. The remainder was exported to Japan and Europe.

The reduction in Australia's aluminum output was due to Alcan Australia Ltd.'s smelter operating at less than its rated capacity. The annual production capacities at the three established domestic smelters were 165,000 tons at Point Henry (Alcoa), 117,000 tons at Bell Bay (Comalco), and 90,000 tons at Kurri Kurri (Alcan). Boyne Smelter Ltd. (Comalco) began commissioning its Boyne Island plant in February. When stage 1, comprising two potlines, is completed in early 1984, the smelter will have a capacity of 206,000 tons.

Copper.—Despite the depressed demand for copper in the world economy, Australian mine production reached a near record level in 1982. Mine production increased because of higher output from Mount Isa, Queensland, and Teutonic Bore, Western Australia; Cobar and Woodlawn, New South Wales; and Mount Gunson, South Australia. Copper production would have been even higher except for reduced output from the Tennant Creek Mine in Northern Territory and the closure of the Dianne and Mount Chalmers Mines in Queensland.

Mount Isa produced over 95% of Queensland's mine output. Production of copper sulfide ore increased by about 18% to 5.3 million tons. Also, a slightly higher grade of ore milled (3.5%) resulted in an increase in concentrate produced. Mount Isa's copper ore was mined primarily from the 1100 and 1900 ore bodies, which have been the major source of ore at Mount Isa since the late 1960's and contained sufficient recoverable ore to continue as the main source of supply until well into the 1990's.

The slight refinery production increase in 1982 was attributed primarily to production by The Electrolytic Refining and Smelting Co. of Australia Ltd. Production of refined copper by Mount Isa decreased. Production was affected by some internal industrial disruption and interruption to power supply during the year. Blister production increased slightly because of higher output at Mount Isa and Mount Morgan, despite lower production at Port Kembla and the closure of the Tennant Creek smelter late in 1981.

In June 1982, the Roxby Downs Indenture Agreement Act received the assent of the South Australian government. The proposed agreement commits Western Mining Corp. Holdings Ltd. (WMC) and BP Australia Ltd. to spend an additional $50 million on the feasibility study of the Roxby Downs project by 1984. A decision to proceed with the project will be made within 3 years of that date. In a quarterly report for the period ended June 1982, WMC stated that widely spaced drilling has shown the Olympic Dam mineralization, drilled on a 200-meter grid, to be about 2 billion tons at an average grade of 1.6% copper, 0.6 kilogram of uranium oxide per ton, and 0.02 troy ounce of gold per ton. Closer spaced drilling in progress over a part of the area has indicated significant tonnages of higher grade material, but so far drilling density was insufficient to enable the calculation of a firm ore reserve.

Copper concentrate production from the Teutonic Bore open pit mine in Western Australia commenced during the year. Early metallurgical problems experienced with the oxidized upper levels of the ore body resulted in low metal recoveries, but these problems were largely overcome by mid-1982. The planned production rate of 300,000 tons of ore annually was reached by yearend.

In December, The Broken Hill Associated Smelters Pty. Ltd. (BHAS) announced that it would proceed with the construction of a plant at Port Pirie for the production of market-grade copper metal from byproduct materials. The plant would have a capacity to produce 4,000 tons of pure copper annually and would cost about $12.3 million. Commissioning of the plant was planned for the latter half of 1984.

Table 4.—Australia: Major copper production,[1] by company

(Metric tons)

Company	1980	1981[r]	1982
Mines:			
Cobar Mines Pty. Ltd	6,593	4,600	8,200
Mount Isa Mines Ltd	158,732	144,800	164,300
Mount Lyell Mining and Railway Co. Ltd	19,835	21,147	17,860
Mount Morgan Ltd	2,302	3,484	3,327
Peko-Wallsend Ltd	11,835	17,128	12,268
Smelters:[2]			
The Electrolytic Refining and Smelting Co. of Australia Ltd.[3]	18,754	18,000	17,500
Mount Isa Mines Ltd	148,260	132,310	148,210
Mount Morgan Ltd	6,393	6,964	5,889
Refineries:[4]			
The Electrolytic Refining and Smelting Co. of Australia Ltd.[3]	[r]12,737	12,200	13,500
Mount Isa Mines Ltd	[r]132,091	146,689	138,021

[r]Revised.
[1]Metal content of ore.
[2]Primary blister copper.
[3]Treats concentrates from Cobar.
[4]Primary electrolytic copper.

Gold.—Mine production of gold rose substantially in 1982. The bulk of the increase was attributable to Western Australia, where most producers recorded substantially higher ore grades throughout the year. Exploration, new development, and redevelopment continued at a high level with major emphasis in Western Australia and the Northern Territory. Production from Kalgoorlie Mining Associates' Fimiston Mine, which completed its first year of operation since reopening, exceeded 64,301 troy ounces. The Kambalda plant, operated by WMC, produced more than 51,441 troy ounces. Output was also higher from Whim Creek Consolidated NL's Haveluck Mine at Meekatharra and from Kia Ora Gold Corp. NL's Marvel Loch operations. New production came from WMC's Lancefield Mine, which began production during the year, and from North Kalgurli Mines Ltd.'s Fimiston Mine, which was reopened late in 1981. In the Northern Territory, output from Peko-Wallsend Ltd.'s Tennant Creek Mines was also higher, resulting from increased emphasis on gold production during 1982.

Development work proceeded at a number of projects, most in Western Australia. In Kalgoorlie, Gold Resources Pty. Ltd. continued redevelopment of the Paringa Mine and commissioned sections of the treatment plant. A mining rate of 130,000 tons per year is planned by mid-1983. Kalgoorlie Mining Associates announced plans to improve recovery at the Oroya mill

with the installation of a plant to treat oxidized ores and flotation tailings. At Mount Charlotte, work on the Cassidy shaft, which provides access to new ore zones, was ahead of schedule. North Kalgurli Mines embarked on a 2-year plan to reestablish ore production at Fimiston of 350,000 tons annually and to improve mine and mill operating efficiency. Since the mine's reopening in 1981, production was below capacity.

Gold treatment facilities, including a roasting plant, were commissioned at the Windarra nickel plant to process ore from the Lancefield open cut mine. A shaft for underground access at Lancefield was nearing completion at the end of 1982.

Carr Boyd Minerals Ltd. commenced evaluation of ore reserves at Harbour Lights, following completion of a drilling program that intersected extensive mineralization. Metana Minerals NL reported 280,000 tons of ore averaging 0.14 troy ounce of gold per ton, at the Reedy Prospect, near Meekatharra.

In Victoria, BHP restarted production from Gaffneys Creek. CRA began preparation of a detailed technical report for submission to the Victorian government, covering research into the feasibility of extracting gold by solution mining.

In Queensland, Central Coast Exploration NL announced plans for a central 150,000- to 200,000-ton-per-year, heap-leaching operation based on prospects in the Croydon area. In the Northern Territory, Enterprise Gold Mines NL announced resources of 5.1 million tons of ore averaging 0.11 troy ounce of gold per ton at its Pine Creek deposit.

Gold from domestic mines accounted for about 80% of Australia's output in 1982, and refined gold produced from imported crude bullion and domestic and imported scrap accounted for the remainder. The Perth mint produces the bulk of refined gold in Australia from crude bullion produced in Western Australia and the Northern Territory and from imported bullion and scrap. Other gold refiners were Matthey Garrett Pty. Ltd., in Sydney, and Engelhard Industries Pty. Ltd., in Melbourne. Crude bullion from Fiji and Papua New Guinea was refined by Matthey Garrett. Two base metal refineries were also sources of refined gold. Electrolytic Refining and Smelting recovered about 10,000 troy ounces of gold from tankhouse sludges resulting from electrolytic refining of copper at Port Kembla, and BHAS recovered about 7,500 troy ounces from lead concentrates refined at Port Pirie, South Australia.

Iron and Steel.—Australia's iron ore output increased partly because of fewer industrial disruptions. World demand, however, remained depressed, and there was some stock accumulation. Increased output at Paraburdoo, Mount Tom Price, and Pannawonica was partly offset by reduced production at Mount Newman, all located in Western Australia.

Production of pig iron decreased by 13%, reflecting reduced steel requirements as well as reduced export demand. The Kwinana blast furnace, which produced mainly for export, was closed indefinitely in April. Furnaces that supplied steelmaking requirements that were taken out of service in mid-year included numbers 1 and 3 furnaces at Newcastle and numbers 2 and 3 furnaces at Port Kembla. Steel production also showed a significant decline in 1982, with output down at all steelmaking centers. Output at Port Kembla dropped by 19% to 3.6 million tons, at Newcastle by 14% to 1.9 million tons, and at Whyalla by 10% to 0.9 million tons. At Port Kembla, open hearth steel production was reduced by approximately 50%. In addition to basic steelmaking plant reductions, rolling mill cutbacks at all steelworks reduced steel product output by BHP by 17% to 5 million tons.

As in recent years, most of the iron ore was produced in the Pilbara region in northwest Western Australia. In this area, five major companies produced about 90% of Australia's total iron ore output. They were Hamersley Iron Pty. Ltd. (Mount Tom Price and Paraburdoo); Mount Newman Iron Ore Pty. Ltd. (Whaleback Hill); Cliffs Western Australia Mining Co. Pty. Ltd. (Robe River); Goldsworthy Mining Ltd. (Mount Goldsworthy, Shay Gap, Sunrise Hill); and Dampier Mining Co. Ltd. (Koolan Island and Yampi Sound). In addition to the Pilbara region, iron ore was mined at Kollyanobbing by Dampier for use in the Kwinana blast furnace. In South Australia, BHP produced ore from the Middleback Ranges for steel plants in Whyalla, South Australia, and in New South Wales (Newcastle and Port Kembla). In a relatively small project, the iron ore at Savage River, Tasmania, was slurried and pumped to a pelletizing plant at Port Latta for shipment to Japan.

Exports of iron ore increased by 2%

mainly because increased exports to Europe, Taiwan, and the Republic of Korea offset reduced shipments to Japan. Shipments to Taiwan and the Republic of Korea increased as steel output in those countries, in contrast to the world trend, continued to expand. The value of exports increased by over 20% to about $1.4 billion because of higher prices and devaluation of the Australian dollar relative to the U. S. dollar in which prices of most contracts are written. Export of pig iron declined again in 1982 after closure of the Kwinana blast furnace. Exports of marketable steel products by BHP, Australia's only steel producer, fell by 7%. The value of exports of all iron and steel products increased by 4% because of the higher value of products shipped. The value of imports increased by 29% to about $615 million. Increased imports of steel, particularly of certain flat products, pipes, and tubes, caused the Government to introduce tariff quotas for those products in August. Australian iron ore exporters and Japanese steel producers concluded negotiations early in 1982 on prices of iron ore for shipment in the year ending March 31, 1983. Price increases ranged from 9.25% to 19.5%.

Australian resources of iron ore were estimated at 35 billion tons consisting of 25 billion tons of hematite with 54% or more iron content and 10 billion tons of limonite with 50% or more iron content. Most of Australia's reserves occur in the Pilbara region, which accounted for over 90% of the production in 1982.

Table 5.—Australia: Major iron ore production, by company

(Thousand metric tons)

Company	Location	Products	Output	
			1981	1982
The Broken Hill Pty. Co. Ltd	South Australia	Lump and pellets	3,200	4,400
Do	Western Australia	Lump	2,720	2,100
Goldsworthy Mining Ltd	do	do	6,294	5,852
Hamersley Iron Pty. Ltd	do	Lump and pellets	29,219	33,500
Mount Newman Mining Co. Pty. Ltd	do	Lump	27,753	27,500

Lead and Zinc.—Australia produced and processed record tonnages of lead and zinc ore. Significant increases occurred at the Broken Hill Mines, operated by Australian Mining & Smelting Ltd. (AM&S), and at the Mount Isa Mine, operated by Mount Isa Mines Ltd. (MIM). The increase at Broken Hill was attributed to additional concentrator capacity, which permitted the mining of larger quantities of lower grade ore. At Mount Isa, production capacity was increased by 20%. Mine output at North Broken Hill Ltd. and at Mineral Mining & Metallurgy Ltd. mines, also operating at Broken Hill, remained at approximately the same level as in 1981. Production increased at the west coast mines in Tasmania but declined slightly at Cobar and Woodlawn.

Production of lead bullion also increased substantially in 1982. The increase was attributed to Mount Isa's record output resulting from the enhanced operating efficiency of its lead smelter. Production by Sulphide Corp. Pty. Ltd. at Cockle Creek decreased slightly. BHAS, Australia's only producer of primary refined lead, increased production in 1982. Production of secondary refined lead decreased because of the curtailment of production at some plants and closure of others. Production of primary refined zinc decreased slightly; increased output at Risdon was offset by decreases at Cockle Creek and Port Pirie.

MIM remained Australia's largest single producer of lead and zinc. Some 3 million tons of lead and zinc ore was mined that contained 6.7% lead and 6.3% zinc. The record treatment of ore through the concentrator was made possible by improved operating efficiency at the plant, the modernization of the flotation sections, and the conversion of a grinding section previously used to retreat smelter slag to treat ore.

The development program to increase production of contained lead at Mount Isa from 150,000 to 180,000 tons annually was substantially completed at yearend. The record level zinc concentrate production resulted from ore treated and the higher average zinc grade of 6.3%. Additional concentrate filtering and storage facilities were commissioned during the year to treat the additional throughput in 1982 and onwards.

MIM's position as a producer of zinc concentrate was enhanced by increased production from the Teutonic Bore Mine. Production commenced in mid-1981 as an open pit operation. The oxidized upper levels of

the ore body initially presented metallurgical problems resulting in low metal recoveries, but these problems were overcome and concentrate production in 1982 exceeded estimates. Sinking of a decline for proving deeper ore commenced during the year and was proceeding ahead of schedule.

Mine output by AM&S and two subsidiaries—Zinc Corp. Ltd. and New Broken Hill Consolidated Ltd. (NBHC)—increased significantly over the 1981 level. The increase in production reflects the completion in 1981 of the expansion program at the NBHC concentrator to permit the mining and treatment of larger quantities of lower grade ore.

The Woodlawn Mine joint venture, consisting of St. Joe Minerals Corp. and Phelps Dodge Corp. of the United States and CRA, increased its zinc concentrate production slightly, but lead concentrate continued to decline reflecting a lower lead-head grade.

The BHAS refinery operated at capacity in 1982, producing record levels of lead and zinc. Raw materials treated comprised mainly Broken Hill concentrates. In addition, 20,000 tons of lead bullion from Sulphide Corp. was refined at Port Pirie. The study of process technology options available for long-term lead smelting and refining at Port Pirie was being evaluated. The zinc expansion feasibility study was completed. The Rosebery and Hercules Mines on the west coast of Tasmania, operated by EZ Industries Ltd., exceeded the 1981 production level.

Table 6.—Australia: Lead and zinc production, by company

(Metric tons)

Company	1981		1982	
	Lead	Zinc	Lead	Zinc
Electrolytic Zinc Co. of Australasia Ltd. (Read-Rosebery)	19,400	53,000	20,000	56,000
New Broken Hill Consolidated Ltd	63,600	112,500	75,200	135,000
North Broken Hill Ltd	46,000	r35,500	44,000	41,400
Mount Isa Mines Ltd	r122,290	99,000	151,770	131,664
The Zinc Corp. Ltd	59,400	52,500	68,800	84,000

rRevised.

Manganese Ore.—Virtually all production of manganese ore was by Groote Eylandt Mining Co. Pty. Ltd. (GEMCO), a wholly owned subsidiary of BHP. A drop in world steel output caused demand for manganese to remain depressed. Output dropped over 15% and was less than 50% of production capacity (about 2.5 million tons annually) in 1982. This was the second year in succession that a substantial reduction in output occurred. Plans to expand production capacity to about 3 million tons annually remains dormant.

Export of manganese ore from GEMCO remained at about the 1981 level. Decreased shipments to the Republic of Korea, Europe, and Japan were more than balanced by increased exports to the United States and a resumption of shipments to Pakistan and Taiwan. Shipments of ore for domestic consumption, mainly in manganese alloy and pig iron production, decreased significantly.

Ferromanganese production at Bell Bay by Tasmanian Electro Metallurgical Co. Pty. Ltd., a wholly owned subsidiary of BHP, decreased by about 15%, but silicomanganese production increased by 25%. Reduced demand for manganese alloys led to closure of one production furnace in midyear.

Australian manganese reserves were estimated at about 889 million tons in 1982; the main part was on Groote Eylandt. The remainder was located principally in the east Pilbara and Peak Hill regions of Western Australia and at Pernatty Lagoon in South Australia. Known deposits in the Northern Territory were subeconomic. Large secondary enrichment deposits along the outcrop of the Marra Mamba iron formation in the Pilbara were being evaluated. These deposits were low in silica and consisted of about equal proportions of high-grade ore (40% manganese) and lower grade ores suitable for beneficiation.

Nickel.—Despite reduced world output, Australian production of nickel increased by about 19% owing to mine expansion, higher ore grades mined, and improved nickel-in-concentrate recoveries. Shaft haulage installations aimed at increasing production and recovery of deeper ore was completed at Mount Windarra and continued at Agnew. Production at Nepean Mine was suspended at yearend because declining

prices caused it to become uneconomical. Production at Kambalda from 13 separate mines including Carnilya Hill and Mount Edward at Widgiemooltha increased substantially owing to higher throughput and grades. At Greenvale, production increased as higher ore grades were mined.

At Windarra, WMC and Shell Co. of Australia Ltd. continued to increase output until the last quarter of the year, following its recommissioning during 1981 in conjunction with gold recovery operations. The concentrator was recommissioned at the beginning of the year. Part of the plant was converted to toll treat gold ore from the nearby Lancefield gold operation. A carbon-in-pulp section was commissioned, and work commenced on the installation of a roasting section.

Production at Agnew declined in early 1982, but improved during the second half of the year to the rate achieved during 1981. Metallurgical performance also improved significantly in the second half of the year with the grade of concentrate increasing from 9% to 14%. The deeper mineralization at Agnew constitutes one of the world's major undeveloped sulfide deposits. Activities associated with the exploration of these deposits including the equipping of the exploration shaft continued during the year.

Lateritic nickel ore and refined metal were produced in Queensland by a joint venture of Metals Exploration Ltd. and Freeport of Australia Pty. Inc. The Greenvale ore body, 175 kilometers west of Townsville, contained about 1.3% nickel, which was railed to a refinery at Yabulu near Townsville for treatment. Output increased as higher ore grades were mined.

Australia's identified nickel resources calculated in 1982 by the Bureau of Mineral Resources (BMR) came to 459 million tons of sulfide ore and 155 million tons of lateritic ore. WMC's proved and inferred reserves of sulfide ore came to 23 million tons at a grade of 2.5% nickel plus 4 million tons of 3.7% nickel at the Carnilya Hill prospect, which was 56% owned by WMC.

Silver.—Most of the silver produced in Australia was recovered as a byproduct of lead-zinc mining at Mount Isa, Broken Hill, Rosebery, and Woodlawn. Mine output increased by about 20% in 1982. High mine output and increasing grades were reported at Mount Isa and Broken Hill. High grades and improved metal recovery rates were reported at Woodlawn.

Australia's largest producer of silver, MIM, accounted for over 50% of the country's production. Some 3 million tons of lead-zinc ore averaging 5.3 troy ounces of silver per ton was treated to produce over 15 million troy ounces of silver. Over 85% of the silver was recovered from lead concentrates, and the remainder, from zinc and copper concentrates. At Mount Isa, most of the lead concentrate was smelted to lead bullion, which was exported to the company's lead refinery at Northfleet, United Kingdom, where the contained silver was recovered. Silver in electrolytic tankhouse slimes from the Townsville copper refinery was recovered by Electrolytic Refining and Smelting at Port Kembalda.

The Broken Hill Mines and the Woodlawn Mine was Australia's second largest source of silver in 1982. The bulk of the silver produced at Broken Hill was contained in lead concentrates, most of which were treated at the BHAS lead refinery. At Woodlawn, the source of silver production was lead, zinc, and copper concentrates. (Electrolytic Zinc Co. of Australia Ltd. (EZ Co.) produced silver as a byproduct of zinc-lead-copper mining at Rosebery.)

About 80% of all silver exported was contained in lead bullion; lead, zinc, and copper concentrates; blister copper; and various slags, mattes, and residues.

Table 7.—Australia: Major silver production, by company

(Thousand troy ounces)

Company	1981	1982
Electrolytic Zinc Co. of Australasia Ltd. (Read-Rosebery)	1,930	2,040
Mount Isa Mines Ltd	11,768	15,600
New Broken Hill Consolidated Ltd	1,837	2,015
North Broken Hill Ltd	2,500	4,000
Zinc Corp. Ltd	1,410	1,779

Tin.—Although mine production of tin-in-concentrates was affected by export quotas imposed by the International Tin Council in late 1982, increased production earlier led to a higher overall output. However, production of primary refined tin declined, as demand for use in tin plate continued to decline. Australia ranks high in the Western World as a producer of tin-in-concentrates, and over 50% of the production was exported.

Renison Ltd., owned by Renison Goldfields Consolidated Ltd., is the world's largest underground tin mine. Tin-in-concen-

trates was produced from mining, milling, and concentrating operations at Renison Bell, on the west coast of Tasmania. Ore production decreased by 2% from 656,400 tons in 1981 to 642,900 tons in 1982.

Ore treatment in the expanded concentrator averaged slightly less than designed rates because mill feed from the mine was below required levels owing to industrial disputes. Despite the loss of 1,233 mill hours because of the problems, throughput decreased by only 1.4% to 642,900 tons of ore compared with that of 1981. Recovery at 71.6% was the best yet achieved from a metallurgically complex ore with a head grade of 1.16%. Improved leaching efficiencies enabled an average concentrate grade of 48.9% to be achieved for 1982.

Aberfoyle Ltd., a major Australian tin producer, operated the Cleveland tin mine at Luina, Tasmania, and the Ardlethan Mine in New South Wales. At the Ardlethan Mine, ore production was 515,200 tons, 23% more than in 1981. The average grade of ore mined was 0.41% tin, compared with 0.54% tin in 1981. Ore treated totaled 481,700 tons, 8% more than in 1981. Average metal recovery at 62.7% was 4% higher than in 1981. This was achieved despite a 19% reduction in the grade of ore treated. The first full year's operation of the tin flotation plant and improvements to the gravity concentrator more than offset the losses in tin recovery that would normally result from a reduction in the grade of ore treated.

Ore production from the Cleveland Mine totaled 366,500 tons compared with 436,000 tons in 1981. Mill throughput was reduced by 20%, but recovery increased by only 9%. This was largely a result of the underground ore sorting procedure, which increased minehead grade and metal recovery with a lower throughput.

Greenbushes Tin NL operated its smelter at 75% of design capacity during 1982. The smelter treated 1,020 tons of concentrate to produce 750 tons of tin and 122 tons of tantalum. The production was significantly above the 1981 total, but failed to reach maximum production only because of the introduction of export quotas in the last quarter. Exploration during the year was confined to delineating high-grade alluvial deposits suitable for economic treatment under current metal prices. Sufficient reserves exist to maintain projected production levels for at least 5 to 8 years.

Associated Tin Smelters Pty. Ltd. (ATS), operating at Alexandria, New South Wales, was the other primary tin smelter. The smelter is owned equally by O. T. Lempriere & Co. Ltd., Consolidated Tin Smelters Pty. Ltd., and Australian Iron & Steel Pty. Ltd. Output of the smelter was limited by the low-average grade of concentrates currently available to it and can effectively produce about 7,000 tons of refined tin. In 1982, production by ATS was affected by industrial disputes and 3,100 tons of primary refined tin was produced. Plants in Sydney, Wollongong, and Melbourne produced nearly 400 tons of secondary tin from tin-plating scrap and wastes.

Titanium and Zirconium.—The economic downturn in the major consumer markets adversely affected the demand for titaniferous concentrates, but demand for zircon remained firm. The oversupply of titanium minerals that became evident in the latter part of 1981 continued in 1982. This resulted in further reduction in both production and shipments of Australian rutile and ilmenite concentrates. Production of zircon concentrates increased substantially in Western Australia and was second only to the record total established in 1980.

Australia produces approximately 80% of the world's natural rutile and zircon, 70% of the world's monazite, and more than 25% of the world's ilmenite. As in recent years, virtually all of the rutile, zircon, and monazite output was exported along with about 80% of the ilmenite concentrates. Exports to the United States accounted for more than 30% of total exports, followed by Japan and the United Kingdom. Ilmenite was consumed domestically to produce titanium dioxide pigments and synthetic rutile.

Production of monazite concentrates was maintained at about the 1981 level, of which almost 95% was recovered as byproduct of mineral sand operations in the Eneabba and Capel areas of Western Australia. World demand for rare earths firmed in early 1982 with a marked shift toward metallurgical applications, particularly in the use of rare earths in high-strength, low-alloy steels. Renewed interest was also shown in xenotime and monazite concentrates as a source of yttria for use of phosphorus for color television tubes.

The east coast deposits in New South Wales and Queensland provided the bulk of the country's output of rutile concentrates, but mines at Capel and Eneabba in Western Australia were the country's major suppliers of ilmenite, zircon, and monazite. On the

east coast, Associated Minerals Consolidated Ltd., Consolidated Rutile Ltd., Mineral Deposits Ltd., and Rutile & Zircon Mines Ltd. accounted for most of the output. On the west coast, Allied Eneabba Pty. Ltd. and Westralian Sands Ltd. supplied most of the output of mineral sands.

Australia has considerable reserves of mineral sands. According to a BMR 1982 assessment, identified resources of ilmenite total about 61.5 million tons. About one-third of these resources has too high of a chromium content or otherwise is not suitable for titanium oxide pigment production by the current sulfate process. Economically recoverable reserves of other mineral sands include about 8.5 million tons of rutile, 13 million tons of zircon, and 383,000 tons of monazite. In keeping with its policies to encourage more domestic processing of local mineral production, the Australian Government has been cooperating with the State governments and the mineral sands industry to study the possible creation of new industries using mineral sands as a raw material.

NONMETALS

Diamond.—In 1982, Australia became a commercial producer of diamonds. The Argyle Diamond Mines Joint Venture, in which CRA group companies hold a 56.8% interest, commenced mining and recovery of alluvial diamonds at Argyle in the north of Western Australia. Argyle Diamond Mines Pty. Ltd. (owned 100% by CRA) is the manager and operator of the joint venture.

A program was undertaken during the year to upgrade the plant to enable it to treat 2,000 tons of alluvial material daily. These modifications included construction of a new diamond final recovery plant. Further modifications to expand the plant's capacity to 4,000 tons annually were in progress. This program, costing about $9 million, was expected to be completed during the second quarter of 1983. The plant would then have the capacity to produce about 5 million carats annually from alluvial deposits. Also during 1982, a 34.5-kilometer pipeline was constructed from Lake Argyle to the minesite to provide water for commercial alluvial production and for construction of the proposed large-scale Kimberlite plant.

At yearend, a cumulative total of 408,392 carats of diamonds had been recovered from 62,846 tons of ore from the Kimberlite pipe AK-1. An additional 362,353 carats were recovered from 86,715 tons of alluvial material taken from Upper Smoke Creek, 17,823 carats from 22,070 tons from Lower Smoke Creek Alluvium, and 21,809 carats from 11,864 tons recovered from Limestone Creek.

In December, CRA and Ashton Mining signed a diamond export sales agreement with the Central Selling Organization for the sale of their respective portions of the Argyle production.

Phosphate Rock.—Production of phosphate rock from Phosphate Hill, about 65 kilometers south of Duchess, Queensland, continued throughout 1982. Shipments from the mine, which resumed operation in November 1981, began in February 1982, and 102,000 tons was supplied to domestic and Southeast Asian markets. WMC, through its 80.2% ownership of BH South Ltd., controls the Duchess deposits.

Mining was in the high-grade deposit areas where rock can be produced with a 30% P_2O_5 content after washing and screening. The bulk of the deposits was of lower grade rock, and investigations into upgrading the lower grade reserves by both physical and chemical methods continued.

A contract was finalized with the Australian fertilizer industry to take 100,000 tons annually of phosphate rock for 3 years commencing in 1982. Negotiations under the terms of the contract regarding price and quality conditions for 1982 and 1983 deliveries were continuing.

A small amount of phosphate rock was also mined in South Australia in the vicinity of Moculta. Output amounted to about 7,500 tons. The reserves there were small, only about 100,000 tons, so activity will continue to be on a small scale.

Salt.—Production of salt is closely tied to the level of world economic activity. Consequently, Australia's production declined in 1982 owing to a recession in the chemical industry of the sector's main market, Japan. Approximately 80% of Australia's output was exported, and nearly three-quarters of the exports went to Japan. Three companies—Dampier Salt Pty. Ltd., Leslie Salt Co., and Shark Bay Salt Pty. Ltd. (all based in Western Australia)—produced more than 80% of the total output. Producers in South Australia, Victoria, and Queensland supplied the remainder. All production in Australia was by solar evaporation, mainly from seawater but also from lake and underground brines.

Western Australia produced about 3.6

million tons of salt and exports totaled 3 million tons. About two-thirds of Western Australia's salt production was by Dampier Salt from operations at Dampier and Lake MacLeod. In response to reduced demand, combined production from both sites declined to 2.7 million tons, compared with 3.3 million tons in 1981. There was a reduction in industrial disputes compared with those of 1981. Total shipments for the year were 2.6 million tons with 1.9 million tons being shipped from Dampier and 0.68 million tons from Lake MacLeod.

Cargill Inc. produced about 700,000 tons of salt at its Port Hedland plant. Export sales were about 620,000 tons, and domestic sales, 2,000 tons. Lefroy Salt Pty. Ltd. harvested 132,000 tons of salt from it Lake Lefroy ponds and exported 77,000 tons from its Esperance stockpile.

Salt requirements for the Australian industry were supplied mainly by producers in Queensland, Victoria, and South Australia. The principal producer in South Australia and Queensland was Imperial Chemical Industries of Australia and New Zealand Ltd., which operated solar evaporation projects. In Victoria, virtually all of the State's output was produced by Cheetham Salt Ltd.

Australia's consumption of salt in 1982 was estimated at 900,000 tons, of which about 600,000 tons was used by the chemical industry for producing sodium hydroxide and sodium carbonate and 260,000 tons were used in industrial applications, in food processing, and in households.

Sulfur.—No deposits of elemental sulfur are known in Australia, and domestic requirements of sulfuric acid were met from imported brimstone. Also, smaller quantities of sulfur were recovered from sulfur-bearing emissions of some metal sulfide smelting operations and from oil refining. About 95% of the sulfur was consumed in the form of sulfuric acid to produce fertilizer, particularly superphosphate.

Sulfur was also obtained from petroleum by Petroleum Refineries Ltd. at Altona, Victoria, and Hallett's Cove, South Australia; Shell Refining Pty. Ltd. at Clyde, New South Wales, and Geelong, Victoria; Australian Oil Refining Pty. Ltd. at Kernell, New South Wales; and Amoco Pty. Ltd. at Bulwer Island, Queensland. The combined capacity of the plants was up to 52,000 tons per year, but the total output from petroleum in 1982 was about 14,000 tons.

Only EZ Co., at Rosebery, and The Mount Lyell Mining and Railway Co. Ltd. produced pyrite for acid production as a byproduct of base metal mining. Acid from this pyrite was produced at Burnie, Tasmania, by North-West Acid Pty. Ltd. in which the mining companies each have a 50% interest. The production by North-West Acid totaled about 273,018 tons of sulfuric acid compared with 281,000 tons in 1981.

MINERAL FUELS

Coal.—Despite the world economic recession that confronted the world coal industry in 1982, Australia expanded its previously established production record. The growth in production can be attributed to increasing contributions by new mines in New South Wales and Queensland as well as greater industrial harmony in the mines. Australia's production capability will increase further in the next couple of years as new mines such as Oky Creek and Riverside (Queensland) come onstream. There were smaller operations in the Collie Field of Western Australia and in Tasmania. Subbituminous coal at Leigh Creek in South Australia was mined for power generation use.

Consumption rose only slightly because of the general economic recession in Australia. Difficulties encountered by the steel industry restricted demand in that sector. Demand for coal for electricity generation was also restricted by the economic decline.

In response to economic difficulties facing coal producers, the Federal Government removed the $1 per ton export levy applied to some coals. The $3.50 per ton export levy applied to some coking coals was retained. The New South Wales government froze royalty rates on coal at $1.70 per ton until June 30, 1983. It was reported that the Queensland government would reduce infrastructure requirements and consider cost problems of new mines in relation to royalties and freight rates.

Production of coal in New South Wales in 1982 rose 7% to 64.9 million tons. Production from underground mines accounted for about 75% of the total output, and open pit mines, the remainder. Despite weaker demand for export coal, particularly in the last half of the year, exports from New South Wales reached the record high total of 25 million tons. Coal-handling capacity at Newcastle has imposed some limitations but is unlikely to improve significantly

until the new Kooragang coal loader becomes operational.

Queensland production of coal increased 6% to 47.8 million tons. In Queensland, most of the coal was won from open cut mines. As a result of lower shipments to Japan, Queensland's exports declined slightly. Japan remains the major buyer of Australian coal. Two open pit coking coal projects continued to progress, and a third one was at the final stage of development. At the end of 1982, coal was being won from 21 open pit and 25 underground mines.

Considerable progress was made with improvement of Australia's export facilities. The New Port Kembla coal loader commenced operations during the year, almost doubling the port's capacity to 14 million tons. At Newcastle, construction of the New Kooragang Island coal loader commenced, and expansion of the Port Waratah Coal Services Ltd. loader was underway. In Queensland, Gladstone Harbor was deepened and construction of the new loaders at Dalymple Bay and Abbot Point was nearing completion.

As a result of continued exploration, Australia's demonstrated resources of black coal total 52.9 billion tons, of which 30.4 billion tons is recoverable. During 1982, 1.3 billion tons was added to the demonstrated resources. Most of the resources were concentrated in the Bowen Basin in Queensland and the Sydney Basin in New South Wales. Although resources are much smaller in Tasmania, South Australia, and Western Australia, they are important energy sources for local use. Exploration in these States was continuing, and in the past year, resulted in further delineation of resources at Woodbury, Tasmania, the Arckaringa Basin, South Australia, and Eneabba, Western Australia.

Lignite.—Victoria was the only State that produced lignite in 1982. The major deposits in Victoria were in the Lathobe Valley, 130 to 200 kilometers southeast of Melbourne, where the State Electricity Commission, at Yallourn and Morwell, produced more than 95% of the State's total output. The remainder was produced from company-owned mines at Anglesea and Bacchus Marsh. Output increased significantly in 1982, as Victoria expanded its generation capacity. Research continued on the future use of coal as feedstock in coal liquefaction schemes.

Australian coal resources are among the largest in the world. Demonstrated and inferred resources of Australian brown coal were listed as 44 billion tons, of which 36.3 billion tons was considered economically recoverable. Total economic and subeconomic brown coal resources were calculated at 126.5 billion tons, of which 116.3 billion tons was considered as potentially recoverable. The brown coal deposits in Australia are more concentrated than those for black coal, with over 95% of the total economic and subeconomic resources located in the Latrobe Valley and adjacent regions.

Petroleum and Natural Gas.—Production of both crude petroleum and natural gas increased compared with that of 1981. Almost 94% of the crude oil production came from the offshore oilfields in the Bass Strait, between Victoria and Tasmania. An additional 5.8% of the total domestic production came from Barrow Island Field off the coast of Western Australia. The small remaining quantity came from the nearly depleted Moonie Field in Queensland. Gas production increased as the gas supply network continued to expand. All of Australia's capital cities, except Darwin, have access to natural gas.

Australia's refineries processed about 200 million barrels of crude oil in 1982. Indigenous crude oil supplied over 65% of this total; the remainder was supplied mainly from the Middle East.

Drilling activity in Australia was at a record level, and a total of 389 wells were drilled for petroleum exploration and development. Of these, 239 were exploratory (187 onshore, 52 offshore) and 150 were development wells (91 onshore, 59 offshore). Highlights of onshore exploration were gas and oil discoveries in the Bowen Basin and gas discoveries in the Cooper, Perth, and Amadeus Basins. Extensions of known fields in the Bowen-Surat, Amadeus, Perth, and Cooper Basins were successfully proven by appraisal drilling. Offshore exploration activity was greatest in the Gippsland and Carnarvon Basins. The only significant oil discoveries were made in the Gippsland Basin, but substantial new discoveries of gas were made in the Browse and Gippsland Basins.

The North West Shelf Natural Gas Development Project moved ahead against excalating costs and delays in export contracts. The project is designed to exploit 8 to 9 trillion cubic feet of gas in the North Rankin and neighboring Goodwyn offshore gasfields, 130 kilometers northwest of Dampier. The first stage of the project was

designed to produce 385 million cubic feet of natural gas per day for the Western Australian domestic market by 1982. The second stage will produce 6 million tons of liquefied natural gas for sale to Japan, 640,000 tons of liquid petroleum gas, and 1.4 million tons of condensate. The total costs for both projects were estimated at $8 billion in 1982 dollars.

Uranium.—Production of uranium oxide in Australia reached a new record high in 1982 increasing more than 50%. The principal reason for the increase in production was that the new Ranger Mine operated throughout the year. With an annual capacity of 3,000 tons of uranium oxide. Ranger was the largest mine operating in the country. Mary Kathleen Uranium Ltd. (MKU) and Nabarlek were other producers.

MKU ceased mining operations in September, and the treatment plant was closed in October. Production by MKU was 858 tons of uranium oxide (727.6 tons of uranium), which was slightly more than in 1981. The company announced that the reserves left unmined and in low-grade stockpiles after the closure would not be adequate to enable the company to continue to operate. Exploration in the vicinity of MKU and elsewhere in the region was unsuccessful. Total production since the mill was recommissioned in 1975 to closure in October 1982 was 4,800.5 tons of U_3O_8 (4,071 tons of uranium).

Energy Resources of Australia Ltd. (ERA) reported production at Ranger exceeded designed capacity. Total production for 1982 was 3,135 tons of U_3O_8 (2,658 tons of uranium). Diamond drilling of the central portion of the No. 3 ore body resulted in a significant upgrading in quantity of ore. ERA reported that the ore reserves, as of July 1982, in the No. 1 and No. 3 ore bodies and in stockpile totaled 51 million tons averaging 0.25% U_3O_8 (125,833 tons of contained U_3O_8).

Production by Queensland Mines Ltd. from stockpiled ore at Nabarlek was less than that for 1981. The company plans to commence an exploration program over its special mineral lease in an effort to locate additional resources.

WMC reported that drilling at Olympic Dam indicated mineralization of 2 billion tons at an average grade of 1.6% copper, 0.6 kilogram of U_3O_8 per ton, and 0.02 troy ounce of gold per ton. Also in September, WMC reported that the feasibility study for the Yeelirrie project was completed and submitted to the joint venture.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Australian dollars ($A) to U.S. dollars at the rate of $A1.00=US$1.02.

The Mineral Industry of Austria

By George A. Rabchevsky[1]

In 1982, the Austrian general economy remained almost immune to recession and inflation stood at 5.4%. Nevertheless, the worldwide recession and inflation affected the mining and mineral industry, as reflected in overall lower production and sales. The mineral industry was small, and the economy continued to depend heavily on tourism for income. A budget deficit of $2.7 billion,[2] or 4% of the gross domestic product (GDP), was caused mainly by the Government's attempt to preserve jobs in the debt-ridden state-owned industries, which included iron and steel. Unemployment was up slightly at 3.7%, in part because of an expanding labor force. Industrial employment continued to decline, 3.5% or 22,000 persons in 1982, mainly because of the international steel crisis in 1981. In 1982, 2,766,350 workers were employed, or 36% of the population, about 10,200 of whom were in the minerals industry. Salaries and wages throughout the economy rose 7.5% and those of miners and of metal workers were considered to be the highest among the labor force.

PRODUCTION

Industrial production, in general, expanded 1% after its fall by 1.2% in 1981. The mining industry and basic materials output, however, declined by 5%. The relatively large Austrian iron and steel industry was beginning to experience problems because of repeated and costly Government-financed bailouts. It was thought that some of the plants might have to be shut down, unable to compete with the cheaper production costs in the lesser developed countries. The high costs of product transportation, labor, and raw materials were a major problem. Nevertheless, labor costs per unit of production rose less in Austria than in most of its European trading partners.

Table 1.—Austria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal:					
Primary	91,284	92,693	94,393	94,758	[2]93,908
Secondary	38,382	41,984	31,926	46,343	[2]39,066
Total	129,666	134,677	126,319	141,101	[2]132,974
Antimony, mine output, metal content of concentrate	509	571	662	603	[2]667
Cadmium metal	33	34	36	55	[2]48
Copper:					
Smelter, secondary	19,800	21,800	26,100	27,100	[2]24,000
Refined:					
Primary[e]	11,485	8,812	8,788	8,395	8,400
Secondary[e]	20,000	24,000	22,498	20,000	20,000
Total	31,485	32,812	31,286	28,395	28,400
Germanium, metal content of concentrates kilograms	4,270	4,500	4,500	4,000	[2]4,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	2,788	3,200	3,200	3,050	[2]3,330
Metal content do	866	[r]1,000	986	948	[2]1,045
Metal:					
Pig iron do	3,077	3,702	3,485	3,476	[2]3,115
Ferroalloys, electric furnace do	7	9	[e]8	[e]8	8
Steel, crude do	4,335	4,917	4,624	4,656	[2]4,258
Semimanufactures do	3,724	3,992	3,818	3,477	[2]3,381
Lead:					
Mine output, metal content of concentrate	4,633	4,499	4,316	4,320	[2]4,086
Metal: Smelter:					
Primary	5,772	5,981	5,418	3,343	3,000
Secondary	9,315	10,825	11,547	12,789	[2]15,251
Total	15,087	16,806	16,965	16,132	[2]18,251
Manganese, Mn content of domestic iron ore	51,351	58,969	47,216	55,876	[2]61,549
Tungsten, mine output, metal content of concentrate	1,179	1,496	1,495	1,434	1,400
Zinc:					
Mine output, metal content of concentrate	22,479	20,539	19,117	18,181	[2]19,065
Metal, refined	21,655	23,238	22,102	22,674	[2]23,000
NONMETALS					
Barite	242	305	249	--	--
Cement, hydraulic thousand tons	5,880	5,611	5,455	5,288	[2]5,012
Clays:					
Illite	395,103	379,042	504,812	331,448	[2]441,497
Kaolin:					
Crude	275,695	330,094	340,980	315,560	[2]351,392
Marketable	77,000	78,553	83,882	[e]80,000	[2]77,298
Other	[e]32,538	46,073	61,635	52,173	[2]15,598
Diatomite	536	--	--	--	--
Feldspar, crude	2,886	6,594	10,946	10,357	[2]2,960
Graphite, crude	40,501	40,519	36,699	23,807	[2]24,451
Gypsum and anhydrite, crude	765,965	798,108	833,417	833,417	[2]727,520
Lime thousand tons	1,016	1,022	1,100	1,138	[2]1,136
Magnesite:					
Crude do	982	1,104	1,318	1,159	[2]1,031
Sintered or dead-burned do	421	423	427	361	[2]370
Caustic calcined do	127	121	132	102	[2]98
Nitrogen: N content of ammonia do	470	520	490	486	[2]485
Pigments, mineral: Micaceous iron oxide	10,560	12,298	10,959	11,320	[2]9,570
Pumice (trass)	8,944	8,162	8,162	8,308	[2]10,551
Salt:					
Rock thousand tons	1	1	1	1	[2]1
In brine:					
Evaporated do	321	380	410	462	[2]434
Other do	188	247	261	264	214
Total do	510	628	672	727	[2]649

See footnotes at end of table.

Table 1.—Austria: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Sand and gravel:					
Quartz sand thousand tons	821	885	878	869	[2]864
Industrial sand do	NA	NA	NA	NA	NA
Other sand and gravel do	10,791	9,900	9,229	9,413	[2]8,496
Total do	11,612	10,785	10,107	10,282	[2]9,360
Sodium compounds, n.e.s.:[e]					
Sodium carbonate, synthetic do	170	170	170	170	170
Sodium sulfate, synthetic do	55	55	55	55	55
Stone:[3]					
Dimension do	NA	NA	NA	NA	NA
Quartz and quartzite do	203	218	219	184	185
Other, quarry and broken do	NA	NA	NA	NA	NA
Total do	11,772	13,042	13,105	12,897	[2]11,080
Sulfur:					
Byproduct:					
Of metallurgy	8,836	9,644	8,731	9,133	[2]9,504
Of petroleum and natural gas	22,586	23,989	18,733	27,861	[2]38,243
From gypsum and anhydrite	26,775	27,102	23,836	25,143	[2]27,102
Total	58,197	60,735	51,300	62,137	[2]74,849
Talc and soapstone	106,848	116,420	116,708	116,425	[2]117,092
MINERAL FUELS AND RELATED MATERIALS					
Coal, brown and lignite thousand tons	3,076	2,741	2,865	3,061	[2]3,297
Coke do	1,484	1,686	1,689	1,606	[2]1,622
Gas, natural:					
Gross million cubic feet	85,247	81,647	67,211	50,730	50,000
Marketed do	71,856	68,790	55,443	[e]50,000	46,760
Oil shale	970	1,160	950	[e]700	--
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	12,486	12,039	10,290	9,324	8,999
Refinery products:					
Gasoline do	[r]13,492	[r]15,280	[r]15,409	16,251	16,500
Kerosine and jet fuel do	[r]988	[r]957	1,053	1,242	1,250
Distillate fuel oil do	19,683	[r]20,980	18,970	15,767	16,000
Residual fuel oil do	28,560	[r]29,547	28,974	21,821	22,000
Lubricants do	1,171	[r]1,214	1,070	767	850
Liquefied petroleum gas do	[r]3,378	[r]3,718	[r]4,470	4,808	4,500
Bitumen do	2,214	[r]2,286	2,173	1,657	1,600
Unspecified do	[r]481	[r]1,453	[r]506	1,283	1,300
Refinery fuel and losses do	[r]2,813	[r]3,286	[r]3,565	3,320	3,300
Total do	[r]72,780	[r]78,721	[r]76,190	66,916	67,300

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through July 14, 1983.

[2]Reported figure.

[3]Excluding stone used by the cement and iron and steel industries.

TRADE

Austria's exports rose by 11.3% to $14.8 billion in 1981, in current prices, equal to nearly one-quarter of the GDP. Exports to European Communities (EC) countries increased by about 50%. The foreign trade deficit was thus reduced by more than one-fifth. More than one-half (53%) of all exports went to the EC. The Federal Republic of Germany was Austria's main trading partner. Almost 62% of all imports came from the EC, more than 10% came from the Council for Mutual Economic Assistance (CMEA), and about 7%, mostly oil, came from the Organization of Petroleum Exporting Countries (OPEC). In 1982, 11% of all Austrian imports came from CMEA countries and 11.10% was exported to them. About 4% of Austrian imports came from the United States. The increase in the U.S. market share in recent years was largely due to growing deliveries of coal, aircraft, and office machines. The U.S. share in total Austrian imports was 3.7% in 1982.

Table 2.—Austria: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Rare-earth metals	196	275	19	West Germany 73; France 64; Italy 51.
Unspecified	4	(1)	NA	NA.
Aluminum:				
Ore and concentrate	92	48	--	Mainly to West Germany.
Oxides and hydroxides including artificial corundum	55,719	43,261	2,966	Romania 11,119; United Kingdom 2,696; Switzerland 2,292.
Metal including alloys:				
Scrap	32,736	56,371	--	West Germany 27,836; Italy 27,035; France 628.
Unwrought	9,797	24,968	--	West Germany 7,252; Japan 5,998; France 2,196.
Semimanufactures	63,564	64,611	2,003	West Germany 14,402; Switzerland 4,681; France 4,575.
Antimony:				
Ore and concentrate	291	26	NA	NA.
Oxides	--	1	--	NA.
Metal including alloys, all forms	1	(1)	--	NA.
Beryllium: Metal including alloys, all forms value	--	$1,071	--	NA.
Cadmium: Metal including alloys, all forms	31	32	--	Czechoslovakia 31.
Chromium:				
Ore and concentrate	291	109	NA	West Germany 69.
Oxides and hydroxides	27	36	NA	Iran 15; West Germany 7; Yugoslavia 7.
Cobalt: Oxides and hydroxides	29	5	--	Belgium-Luxembourg 3; Italy 1; Yugoslavia 1.
Columbium and tantalum: Metal including alloys, tantalum	10	9	NA	NA.
Copper:				
Ore and concentrate	4	19	--	All to Spain.
Sulfate	67	2,158	--	China 2,000; Italy 155.
Metal including alloys:				
Scrap	3,713	5,410	--	West Germany 2,002; United Kingdom 1,385; Belgium-Luxembourg 1,029.
Unwrought	19,340	23,554	--	Italy 9,627; West Germany 8,690; Hungary 3,170.
Semimanufactures	15,041	15,854	57	Italy 6,164; West Germany 2,724; France 1,496.
Gold:				
Waste and sweepings value	$404,699	$150,311	--	West Germany $103,598; Italy $34,784.
Metal including alloys, unwrought and partly wrought troy ounces	22,763	11,317	NA	West Germany 6,559; Switzerland 3,440; Italy 611.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	118	(1)	--	NA.
Metal:				
Scrap	12,721	12,315	--	Italy 7,386; Switzerland 2,327; West Germany 2,068.
Pig iron, cast iron, related materials	12,235	6,421	22	Italy 1,666; West Germany 1,654; Poland 1,420.
Ferroalloys, unspecified	8,904	10,575	114	Romania 2,212; Sweden 1,519; West Germany 1,310.
Steel, primary forms	408,539	405,900	14,692	West Germany 209,690; Yugoslavia 64,505; Italy 61,410.
Semimanufactures:				
Bars, rods, angles, shapes, sections	378,006	405,480	5,300	West Germany 96,564; Italy 88,096; Switzerland 31,205.
Universals, plates, sheets thousand tons	1,148	1,374	6	U.S.S.R. 550; West Germany 355; Italy 118.
Hoop and strip	93,082	101,056	217	West Germany 26,067; Switzerland 16,476; Spain 10,110.
Rails and accessories	84,840	80,919	920	Switzerland 21,919; India 12,995; Bulgaria 7,947.
Wire	61,115	57,735	472	West Germany 21,536; Switzerland 8,155; Italy 6,147.
Tubes, pipes, fittings	205,051	286,187	17,665	West Germany 64,023; U.S.S.R. 31,812; United Kingdom 26,103.
Castings and forgings, rough	14,945	14,227	362	West Germany 3,312; Italy 2,057; Netherlands 1,565.

See footnotes at end of table.

Table 2.—Austria: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead: Metal including alloys:				
Scrap	3	4	--	West Germany 2.
Unwrought	391	334	--	Hungary 151; Czechoslovakia 150; West Germany 23.
Semimanufactures	r22	22	--	West Germany 12; Italy 5; Greece 2.
Magnesium: Metal including alloys:				
Scrap	422	528	--	West Germany 289; Italy 239.
Unwrought	98	275	--	West Germany 250; Netherlands 25.
Semimanufactures	285	430	--	West Germany 244; Sweden 87; United Kingdom 21.
Manganese: Oxides	14	55	--	Yugoslavia 31; Italy 24.
Mercury 76-pound flasks	151	191	--	West Germany 160.
Metalloids: Unspecified	2	18	--	NA.
Molybdenum:				
Oxides and hydroxides	25	26	--	All to West Germany.
Metal including alloys, all forms	1,017	1,018	NA	NA.
Nickel:				
Matte and speiss	8	35	35	
Metal including alloys:				
Scrap	302	451	121	West Germany 198; Netherlands 68; Switzerland 54.
Unwrought	87	105	--	Netherlands 60; Turkey 22; West Germany 21.
Semimanufactures	596	581	169	Algeria 165; Iran 58; West Germany 24.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified troy ounces	10,288	9,259	--	West Germany 4,694; Romania 2,990; Yugoslavia 804.
Silver:				
Waste and sweepings value, thousands	$1,009	$277	--	United Kingdom $214; West Germany $63.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,436	997	--	West Germany 357; Yugoslavia 329; Switzerland 259.
Tin:				
Oxides	30	(1)	--	NA.
Metal including alloys:				
Scrap	3	2	--	All to West Germany.
Unwrought	19	17	--	West Germany 12; Greece 3; Yugoslavia 2.
Semimanufactures	8	3	--	West Germany 2.
Titanium: Oxides	29	26	--	Switzerland 11; Yugoslavia 7; West Germany 4.
Tungsten:				
Oxides and hydroxides	5	--		
Metal including alloys, all forms	1,111	1,243	NA	NA.
Zinc:				
Oxides	616	678	--	Hungary 625; West Germany 40.
Metal including alloys:				
Scrap	70	703	--	West Germany 656; Italy 46.
Unwrought	1,354	2,193	--	Czechoslovakia 840; Hungary 801; Yugoslavia 260.
Semimanufactures	1,005	892	(1)	Yugoslavia 425; West Germany 155; Switzerland 143.
Other:				
Ores and concentrates	134	63	--	West Germany 62.
Oxides and hydroxides	r679	395	120	Italy 119; West Germany 43; United Kingdom 38.
Ashes and residues	73,724	92,526	6	Italy 63,027; West Germany 24,717; Spain 1,901.
Waste and sweepings of precious metals value, thousands	$6,221	$1,940	NA	West Germany $1,475; United Kingdom $248; France $212.
Base metals including alloys, all forms	609	603	81	Italy 242; West Germany 159; United Kingdom 78.

See footnotes at end of table.

Table 2.—Austria: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	11	12	--	Yugoslavia 10; West Germany 2.
Artificial: Silicon carbide	8	83	NA	West Germany 38; Yugoslavia 27.
Dust and powder of precious and semiprecious stones including diamond ---- value	$8,656	$3,780	--	Albania $3,000.
Grinding and polishing wheels and stones	14,032	13,475	50	West Germany 1,892; France 1,082; Romania 908.
Asbestos, crude	4	18	--	All to Switzerland.
Boron materials:				
Crude natural borates	--	1	--	All to Yugoslavia.
Oxides and acids	16	23	NA	Yugoslavia 22.
Cement	32,632	22,240	--	West Germany 12,912; Yugoslavia 4,518; Italy 2,858.
Chalk	2,495	2,604	--	Hungary 1,804; Iran 240; Italy 219.
Clays and clay products:				
Crude:				
Bentonite	2	3	--	NA.
Chamotte earth	(1)	25	--	NA.
Dinas earth	273	765	NA	Hungary 396; Poland 119; Finland 117.
Kaolin	29,075	24,987	NA	Hungary 10,743; Italy 10,474; Switzerland 760.
Unspecified	r1,090	135	NA	West Germany 75; India 17.
Products:				
Nonrefractory	79,908	72,384	--	West Germany 65,809; Italy 2,807; Switzerland 2,259.
Refractory including nonclay brick	r356,382	328,992	3,971	West Germany 41,069; France 32,567; Italy 27,103.
Diamond:				
Gem, not set or strung value, thousands	$813	$349	--	West Germany $172; Switzerland $67; United Kingdom $60.
Industrial ---- value	$11,284	$2,951	--	West Germany $1,975; Belgium-Luxembourg $976.
Diatomite and other infusorial earth	1,135	492	--	Yugoslavia 188; Czechoslovakia 161; Hungary 51.
Feldspar, fluorspar, related materials:				
Fluorspar	--	9	--	West Germany 5; Yugoslavia 2.
Fertilizer materials:				
Crude, n.e.s	669	229	--	Switzerland 128; Italy 74.
Manufactured:				
Phosphatic	10,058	16,285	NA	Hungary 13,218; Czechoslovakia 3,039.
Potassic	--	7	--	NA.
Unspecified and mixed	720,738	748,924	15	West Germany 460,850; Italy 57,743; Egypt 40,341.
Graphite, natural	16,576	14,640	15	Poland 6,570; West Germany 4,254; East Germany 1,025.
Gypsum and plaster	136,888	191,836	--	West Germany 175,627; Italy 14,936; Hungary 1,194.
Halogens: Unspecified	(1)	5	--	All to West Germany.
Lime	1,404	1,173	--	West Germany 1,029; Hungary 68; Poland 42.
Magnesium compounds: Magnesite	137,836	96,636	334	West Germany 32,497; France 12,974; Hungary 12,194.
Mica:				
Crude including splittings and waste	230	448	--	Yugoslavia 271; Greece 150; West Germany 21.
Worked including agglomerated splittings	135	136	--	Yugoslavia 33; West Germany 28; Czechoslovakia 27.
Pigments, mineral:				
Natural, crude	5,902	7,047	89	West Germany 2,069; United Kingdom 1,393; Australia 817.
Iron oxides and hydroxides, processed	6,301	500	--	West Germany 304; Netherlands 160; United Kingdom 19.
Precious and semiprecious stones other than diamond:				
Natural ---- thousand carats	3,200	1,025	45	West Germany 690; Finland 45; Italy 15.
Synthetic ---- do	7,465	6,315	1,890	West Germany 690; Japan 425; United Kingdom 360.

See footnotes at end of table.

Table 2.—Austria: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pyrite, unroasted	19	46	--	Spain 44; Italy 1.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	3	42	NA	Yugoslavia 40.
Sodium carbonate, natural and manufactured	471	1,777	NA	Hungary 1,057; Yugoslavia 602; Egypt 70.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	153,366	107,248	--	West Germany 102,885; Switzerland 4,287.
Worked	23,302	22,760	220	West Germany 12,056; Switzerland 10,096; Hungary 89.
Dolomite, chiefly refractory-grade	6,865	4,965	--	West Germany 3,861; France 443; Iraq 176.
Gravel and crushed rock	441,312	465,493	--	Switzerland 241,081; West Germany 215,266; Hungary 5,140.
Limestone other than dimension	469	971	--	West Germany 956; Switzerland 15.
Quartz and quartzite	57	156	--	Netherlands 69; West Germany 26; East Germany 23.
Sand other than metal-bearing	149,885	187,914	--	Switzerland 96,911; West Germany 26,212; Italy 3,115.
Sulfur: Sulfuric acid	5,486	5,835	NA	Yugoslavia 3,539; Italy 2,039; Switzerland 180.
Talc, steatite, soapstone, pyrophyllite	97,760	101,322	233	West Germany 52,176; Italy 15,515; Switzerland 7,374.
Other:				
Crude	r5,798	5,918	NA	West Germany 4,698; France 557; Netherlands 224.
Slag and dross, not metal-bearing	174,295	108,887	--	West Germany 96,293; Italy 6,372; Czechoslovakia 2,278.
Oxides and hydroxides of barium, magnesium, strontium, kilograms	300	200	--	NA.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	134	35	--	East Germany 30.
Carbon: Carbon black	203	50	--	All to West Germany.
Coal:				
Anthracite and bituminous	80	158	--	Yugoslavia 87; Switzerland 62.
Briquets of anthracite and bituminous coal	18	36	--	Switzerland 28; Yugoslavia 8.
Lignite including briquets	24,071	19,556	--	West Germany 19,485; Switzerland 38.
Coke and semicoke	1,655	546	--	West Germany 280; Sweden 180; Switzerland 83.
Gas, natural, thousand cubic feet	--	424	--	NA.
Hydrogen, helium, rare gases, do.	r33,694	31,862	NA	Hungary 9,375; Romania 7,496; Czechoslovakia 2,780.
Peat including briquets and litter	836	2,087	--	Italy 1,414; West Germany 480; Switzerland 193.
Petroleum and refinery products:				
Crude, 42-gallon barrels	15	51	--	All to Czechoslovakia.
Refinery products:				
Liquefied petroleum gas, do.	673,368	208,916	--	Netherlands 131,579; West Germany 59,972; Italy 9,686.
Gasoline, do.	r69,811	38,395	--	West Germany 17,340; Yugoslavia 6,724; Czechoslovakia 5,236.
Mineral jelly and wax, do.	174,926	141,740	NA	Netherlands 89,269; West Germany 40,680; Italy 6,571.
Kerosine and jet fuel, do.	r6,673	86,924	--	U.S.S.R. 74,594; Hungary 4,224; West Germany 3,108.
Distillate fuel oil, do.	1,574	2,111	--	Yugoslavia 1,358; Czechoslovakia 753.
Lubricants, do.	r538,209	497,119	14	Czechoslovakia 182,833; Hungary 111,867; Yugoslavia 96,712.
Residual fuel oil, do.	959	992	--	Czechoslovakia 553; Switzerland 233; Yugoslavia 153.
Bitumen and other residues, do.	24,525	24,028	--	Yugoslavia 7,139; West Germany 6,405; Algeria 2,745.
Bituminous mixtures, do.	44,808	37,899	--	Algeria 15,077; West Germany 8,387; Libya 4,745.
Petroleum coke, do.	94	--		
Tars and other crude chemicals derived from coal, gas, and petroleum	18,108	19,059	--	West Germany 14,796; Yugoslavia 2,794; France 1,023.

rRevised. NA Not available.
1Less than 1/2 unit.

Table 3.—Austria: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Alkaline-earth metals	(1)	4	NA	NA.
Rare-earth metals	2	3	--	All from West Germany.
Unspecified	81	37	1	West Germany 35; Netherlands 1.
Aluminum:				
Ore and concentrate	41,706	36,655	NA	NA.
Oxides and hydroxides	237,761	274,413	NA	NA.
Metal including alloys:				
Scrap	52,632	68,023	462	U.S.S.R. 47,273; Hungary 8,763; Czechoslovakia 2,816.
Unwrought	35,182	33,160	21	West Germany 19,910; Norway 4,412; France 2,379.
Semimanufactures	38,947	37,352	56	West Germany 17,905; Switzerland 6,068; Italy 3,686.
Antimony:				
Ore and concentrate	467	37	--	All from Canada.
Oxides	NA	98	--	Belgium-Luxembourg 69; West Germany 14; United Kingdom 13.
Metal including alloys, all forms	63	52	NA	Belgium-Luxembourg 47.
Cadmium: Metal including alloys, all forms	5	3	--	France 2.
Chromium:				
Ore and concentrate	77,407	42,334	--	Republic of South Africa 27,924; Philippines 4,598; Turkey 3,928.
Oxides and hydroxides	697	371	--	West Germany 234; U.S.S.R. 121; Italy 15.
Cobalt: Oxides and hydroxides	4	3	1	Belgium-Luxembourg 1; West Germany 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum	37	19	8	Italy 5; Japan 3; Taiwan 3.
Copper:				
Ore and concentrate	(1)	24	--	All from Italy.
Oxides and hydroxides	44	47	NA	West Germany 25; Belgium-Luxembourg 20.
Sulfate	562	613	--	Italy 586; West Germany 26.
Metal including alloys:				
Scrap	20,112	18,074	18	West Germany 8,174; Hungary 4,377; U.S.S.R. 2,658.
Unwrought	15,648	12,975	12	Republic of South Africa 7,463; West Germany 2,455; Chile 1,201.
Semimanufactures	61,579	63,183	65	West Germany 32,616; France 8,353; Belgium-Luxembourg 5,042.
Gold:				
Waste and sweepings value	--	$9,857	--	NA.
Metal including alloys, unwrought and partly wrought troy ounces	27,296	100,953	4,405	Republic of South Africa 37,038; West Germany 36,620; Switzerland 19,966.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	3,336	3,423	--	Brazil 1,036; Canada 841; Sweden 789.
Pyrite, roasted	48,448	45,515	--	Yugoslavia 33,178; West Germany 7,179; Italy 5,156.
Metal:				
Scrap	143,216	169,755	82	West Germany 71,169; Bulgaria 38,481; Czechoslovakia 22,902.
Pig iron, cast iron, related materials	103,294	81,995	6	U.S.S.R. 39,334; West Germany 11,634; Canada 10,127.
Ferroalloys:				
Ferrochromium	24,578	16,827	--	Yugoslavia 4,120; U.S.S.R. 3,369; Czechoslovakia 3,423.
Ferromanganese	23,070	21,804	--	Norway 12,390; West Germany 6,622; Yugoslavia 1,802.
Ferromolybdenum	109	31	2	West Germany 14; Spain 5; Sweden 4.
Ferrosilicon	14,020	13,368	--	Yugoslavia 7,824; U.S.S.R. 2,116; West Germany 1,364.
Unspecified	23,081	11,329	--	West Germany 2,304; Czechoslovakia 2,101; France 1,036.

See footnotes at end of table.

Table 3.—Austria: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Steel, primary forms	185,941	181,564	(1)	Bulgaria 49,238; West Germany 39,493; Hungary 37,161.
Semimanufactures:				
Bars, rods, angles, shapes, sections	241,153	232,755	16	West Germany 112,732; Italy 67,000; Belgium-Luxembourg 17,519.
Universals, plates, sheets	227,436	223,979	140	West Germany 114,778; Belgium-Luxembourg 20,347; Italy 19,729.
Hoop and strip	75,722	67,802	4	West Germany 49,573; Italy 5,470; France 3,621.
Rails and accessories	4,908	5,725	--	West Germany 2,989; Switzerland 1,580; Belgium-Luxembourg 402.
Wire	27,217	27,158	372	West Germany 10,505; Belgium-Luxembourg 4,917; France 4,848.
Tubes, pipes, fittings	159,224	155,902	75	West Germany 86,453; Italy 21,192; Switzerland 9,120.
Castings and forgings, rough	12,598	12,502	2	West Germany 9,437; Italy 908; Switzerland 780.
Lead:				
Ore and concentrate	4,156	1,728	--	All from Italy.
Oxides	282	1,009	--	West Germany 681; Netherlands 304; Bulgaria 21.
Metal including alloys:				
Scrap	2,628	3,605	--	Switzerland 2,657; Hungary 521; West Germany 385.
Unwrought	32,396	35,740	56	West Germany 16,201; Belgium-Luxembourg 4,857; Denmark 3,685.
Semimanufactures	941	750	--	West Germany 607; United Kingdom 74; Denmark 38.
Magnesium: Metal including alloys:				
Scrap	201	52	--	All from West Germany.
Unwrought	1,823	1,968	381	Italy 819; Norway 423; Canada 162.
Semimanufactures	204	159	22	West Germany 98; Switzerland 14; United Kingdom 14.
Manganese:				
Ore and concentrate, metallurgical-grade	1,726	459	--	Australia 225; Netherlands 156; Belgium-Luxembourg 39.
Oxides	111	34	--	All from West Germany.
Mercury 76-pound flasks	566	441	--	West Germany 334; Spain 52; U.S.S.R. 49.
Metalloids:				
Arsenic, oxides and acids	15	9	--	West Germany 6.
Unspecified	5,502	5,677	--	Netherlands 4,283; Italy 845; West Germany 404.
Molybdenum:				
Oxides and hydroxides	1,527	1,493	NA	NA.
Metal including alloys:				
Scrap	322	182	8	Hong Kong 61; Australia 56; Canada 30.
Unwrought	42	2	NA	Mainly from West Germany.
Semimanufactures	2	5	3	West Germany 1.
Nickel:				
Matte and speiss	1,279	734	314	Netherlands 183; Cuba 176; West Germany 27.
Metal including alloys:				
Scrap	1,597	567	50	West Germany 230; Canada 91; Netherlands 80.
Unwrought	2,378	2,586	234	Canada 465; Republic of South Africa 407; Philippines 261.
Semimanufactures	548	429	155	West Germany 145; Republic of South Africa 48; France 43.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified troy ounces	26,460	24,274	(1)	West Germany 18,358; Switzerland 2,572; U.S.S.R. 1,736.
Silver:				
Waste and sweepings value, thousands	$1,129	$1,235	--	West Germany $1,112; Yugoslavia $123.
Metal including alloys, unwrought and partly wrought thousand troy ounces	4,347	5,859	244	West Germany 4,622; Switzerland 792; United Kingdom 67.

See footnotes at end of table.

Table 3.—Austria: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin:				
Oxides	13	5	--	West Germany 3; Netherlands 1; United Kingdom 1.
Metal including alloys:				
Scrap	(1)	2	--	NA.
Unwrought	557	410	--	West Germany 124; Thailand 88; Bolivia 64.
Semimanufactures	195	130	--	West Germany 89; Netherlands 20; Switzerland 10.
Titanium: Oxides	8,728	8,502	(1)	West Germany 5,668; Italy 609; Finland 591.
Tungsten:				
Ore and concentrate	4,297	3,425	18	Australia 1,761; China 572; France 195.
Oxides and hydroxides	159	160	NA	NA.
Metal including alloys:				
Unwrought	113	51	2	Republic of Korea 20; West Germany 18; Belgium-Luxembourg 8.
Semimanufactures	305	306	74	West Germany 94; United Kingdom 52; Netherlands 41.
Uranium and/or thorium: Oxides and other compounds	876	1,101	3	France 724; United Kingdom 277; India 51.
Zinc:				
Ore and concentrate	8,594	7,721	NA	West Germany 3,011; Czechoslovakia 2,117; Tunisia 1,487.
Oxides	1,103	893	NA	West Germany 820; France 48; Italy 20.
Blue powder	1,016	1,838	NA	West Germany 1,190; France 381; Belgium-Luxembourg 102.
Metal including alloys:				
Scrap	339	251	--	Hungary 227; Switzerland 24.
Unwrought	4,074	4,461	--	West Germany 3,250; Yugoslavia 334; Belgium-Luxembourg 300.
Semimanufactures	1,688	1,153	1	West Germany 377; Belgium-Luxembourg 334; France 192.
Other:				
Ores and concentrates	10,411	10,682	2,554	Republic of South Africa 1,962; Belgium-Luxembourg 1,949; Chile 1,258.
Oxides and hydroxides	r3,278	2,376	10	China 1,907; Republic of South Africa 202; West Germany 83.
Ashes and residues	136,378	137,135	1,323	U.S.S.R. 68,975; East Germany 18,381; Republic of South Africa 13,118.
Waste and sweepings of precious metals value	$459,447	$133,233	NA	Denmark $66,805; Greece $65,361.
Base metals including alloys, all forms	1,929	4,483	188	U.S.S.R. 2,961; France 300; Republic of South Africa 255.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	224	272	11	Italy 130; West Germany 94; Spain 23.
Artificial:				
Corundum	8,595	9,454	650	West Germany 4,417; France 2,801; Poland 880.
Silicon carbide	3,031	2,834	NA	West Germany 1,859; Norway 552; Netherlands 213.
Dust and powder of precious and semiprecious stones including diamond kilograms	301	269	249	Switzerland 15; West Germany 4.
Grinding and polishing wheels and stones	1,367	1,420	20	West Germany 631; Spain 250; Italy 172.
Asbestos, crude	20,241	26,643	23	Canada 12,147; U.S.S.R. 4,758; Zimbabwe 4,003.
Barite and witherite	5,752	8,273	--	Ireland 4,942; West Germany 2,320; Czechoslovakia 1,001.

See footnotes at end of table.

Table 3.—Austria: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Boron materials:				
Crude natural borates	18,094	20,985	6,996	Turkey 13,915; West Germany 50.
Oxides and acids	1,144	665	--	France 500; United Kingdom 122; West Germany 33.
Cement	39,266	40,298	41	West Germany 14,405; Italy 10,234; Yugoslavia 6,041.
Chalk	11,062	7,753	--	Italy 4,436; France 1,894; West Germany 1,159.
Clays and clay products:				
Crude:				
Bentonite	883	954	NA	West Germany 661; Belgium-Luxembourg 150; Italy 60.
Chamotte earth	13,969	17,772	--	Czechoslovakia 14,632; West Germany 2,002; France 666.
Dinas earth	132	133	--	West Germany 127.
Kaolin	101,643	110,723	8,942	Czechoslovakia 47,845; United Kingdom 35,356; West Germany 9,221.
Unspecified	r90,393	90,975	150	West Germany 55,323; Czechoslovakia 24,718; Poland 5,718.
Products:				
Nonrefractory	277,865	247,566	--	Italy 137,397; West Germany 79,862; Switzerland 11,199.
Refractory including nonclay brick	27,501	36,942	41	West Germany 30,981; Czechoslovakia 1,189; France 1,060.
Cryolite and chiolite	204	281	--	Denmark 274; France 7.
Diamond:				
Gem, not set or strung value, thousands	$6,195	$6,337	$155	Israel $2,727; Belgium-Luxembourg $1,609; U.S.S.R. $850.
Industrial do	$357	$236	$1	West Germany $76; Republic of South Africa $57; United Kingdom $32.
Diatomite and other infusorial earth	8,691	8,007	1,643	Hungary 2,675; Denmark 1,483; Czechoslovakia 1,244.
Feldspar, fluorspar, related materials:				
Feldspar	6,111	5,893	--	Sweden 3,305; West Germany 1,884; Italy 530.
Fluorspar	17,298	13,001	--	East Germany 7,865; West Germany 4,622; France 394.
Fertilizer materials:				
Crude, n.e.s	5,282	3,742	NA	West Germany 1,645; Italy 1,408; Switzerland 552.
Manufactured:				
Ammonia	17,486	27,056	--	Romania 12,270; Czechoslovakia 10,219; Hungary 4,276.
Nitrogenous	36,594	75,096	NA	West Germany 39,508; France 21,287; Hungary 8,222.
Phosphatic	91,967	89,252	464	France 43,417; Belgium-Luxembourg 20,539; West Germany 16,854.
Potassic	296,203	267,697	NA	NA.
Unspecified and mixed	143,318	137,218	1,130	West Germany 115,556; Italy 16,026; Hungary 2,493.
Graphite, natural	2,301	1,056	2	West Germany 558; North Korea 300; China 127.
Gypsum and plaster	4,715	11,968	5	West Germany 9,910; East Germany 1,200; Italy 393.
Halogens:				
Chlorine	5,135	6,294	(1)	Italy 6,131; West Germany 107; Switzerland 55.
Unspecified	23	33	--	Netherlands 28; Japan 3.
Lime	3,470	2,657	--	West Germany 1,991; Yugoslavia 343; Italy 232.
Magnesium compounds: Magnesite	125,518	104,491	3,969	Italy 25,325; Israel 20,858; Turkey 20,319.
Mica:				
Crude including splittings and waste	318	231	7	West Germany 108; Norway 27; China 25.
Worked including agglomerated splittings	127	142	11	Switzerland 55; Belgium-Luxembourg 35; Czechoslovakia 15.
Phosphates, crude	409,810	410,412	NA	NA.
Pigments, mineral:				
Natural, crude	25	346	NA	France 274; Spain 62.
Iron oxides and hydroxides, processed	r3,139	3,317	NA	West Germany 3,220; United Kingdom 34.

See footnotes at end of table.

Table 3.—Austria: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Potassium salts, crude	12,216	13,531	--	West Germany 11,238; East Germany 2,293.
Precious and semiprecious stones other than diamond:				
Natural ------ thousand carats	29,640	27,975	500	West Germany 8,570; U.S.S.R. 6,950; Brazil 6,480.
Synthetic ---------- do	51,280	46,175	9,530	Switzerland 19,960; U.S.S.R. 7,685; France 6,425.
Pyrite, unroasted	3,834	582	--	Italy 564; West Germany 17.
Salt and brine	1,277	116	--	West Germany 115.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,591	2,176	NA	West Germany 1,090; Italy 444; France 314.
Sodium carbonate, natural and manufactured	1,387	1,931	--	East Germany 1,341; Poland 342; Italy 94.
Sodium hydroxide	85,660	114,329	NA	West Germany 86,966; Switzerland 8,321; Poland 6,394.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	45,793	42,612	--	Italy 24,664; Republic of South Africa 8,020; West Germany 2,326.
Worked	50,082	40,510	1	Italy 28,726; West Germany 5,824; Yugoslavia 2,216.
Dolomite, chiefly refractory-grade	4,674	3,422	--	Italy 2,496; West Germany 454; Norway 316.
Gravel and crushed rock	303,451	241,649	18	West Germany 197,041; Hungary 21,691; Italy 20,667.
Limestone other than dimension	266	200	--	All from West Germany.
Quartz and quartzite	24,502	32,451	5	Hungary 17,468; West Germany 13,791; Norway 466.
Sand other than metal-bearing	522,065	470,397	9	West Germany 233,997; Czechoslovakia 164,565; Hungary 63,068.
Sulfur:				
Elemental:				
Crude including native and byproduct	124,693	102,818	--	Poland 67,086; West Germany 34,162; Hungary 1,483.
Colloidal, precipitated, sublimed	117	28	--	France 19; West Germany 9.
Sulfuric acid	14,569	24,290	NA	West Germany 17,487; East Germany 5,094; Hungary 1,030.
Talc, steatite, soapstone, pyrophyllite	2,118	1,674	1	Norway 651; Belgium-Luxembourg 423; India 300.
Other:				
Crude	r72,673	67,645	2,528	West Germany 26,082; Hungary 21,192; Republic of South Africa 6,037.
Slag and dross, not metal-bearing	36,659	25,828	37	Italy 16,935; West Germany 6,905; Hungary 873.
Oxides and hydroxides of barium, magnesium, strontium	859	300	NA	West Germany 236; United Kingdom 40; Japan 23.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,876	1,708	50	Trinidad and Tobago 929; Hungary 319; Albania 308.
Carbon: Carbon black	27,915	24,829	884	West Germany 15,194; Italy 6,944; United Kingdom 743.
Coal:				
Anthracite and bituminous thousand tons	2,858	2,714	941	Czechoslovakia 749; Poland 549; West Germany 218.
Briquets of anthracite and bituminous coal	20,208	29,911	--	West Germany 17,523; Hungary 11,215; Italy 809.
Lignite including briquets	588,850	863,075	--	Yugoslavia 437,527; East Germany 285,599; West Germany 113,274.

See footnotes at end of table.

Table 3.—Austria: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	986,337	987,275	--	Czechoslovakia 400,515; Poland 226,235; West Germany 196,985.
Gas natural ----- million cubic feet	106,972	141,212	--	U.S.S.R. 139,874; West Germany 1,335.
Hydrogen, helium, rare gases thousand cubic feet	125,187	99,492	789	West Germany 76,742; Poland 11,896; Yugoslavia 8,048.
Peat including briquets and litter	64,339	65,243	--	West Germany 29,216; U.S.S.R. 23,257; Hungary 6,743.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	61,771	55,856	--	Saudi Arabia 23,349; U.S.S.R. 12,575; Libya 5,829.
Refinery products:				
Liquefied petroleum gas do	707	610	(1)	West Germany 401; U.S.S.R. 90; Hungary 63.
Gasoline do	r7,147	4,820	(1)	Italy 2,199; West Germany 1,806; Belgium-Luxembourg 397.
Mineral jelly and wax do	128	118	(1)	West Germany 82; Hungary 18; East Germany 10.
Kerosine and jet fuel do	r119	37	(1)	West Germany 17; Italy 11; Czechoslovakia 4.
Distillate fuel oil do	2,942	1,833	(1)	West Germany 811; Italy 491; Hungary 177.
Lubricants do	r2,748	1,881	6	Hungary 708; Romania 351; Czechoslovakia 147.
Residual fuel oil do	6,903	6,638	--	West Germany 2,308; Czechoslovakia 1,532; East Germany 965.
Bitumen and other residues do	1,439	1,538	(1)	West Germany 853; Italy 474; Hungary 167.
Bituminous mixtures do	45	42	(1)	West Germany 31; Netherlands 9.
Petroleum coke do	231	207	--	West Germany 156; Norway 21; United Kingdom 17.
Tars and other crude chemicals derived from coal, gas, and petroleum	15,518	22,407	80	Italy 6,826; West Germany 6,811; Romania 2,328.

rRevised. NA Not available.
1Less than 1/2 unit.

COMMODITY REVIEW

METALS

The mining tradition in Austria is about 4,000 years old. The copper ore at Muhlbach (Carinthia) for example, had been mined in prehistoric times. The Hallstatt culture of the Bronze Age was also based on the mining of salt in the mountains near Hallstatt, the "Salzkammergut." The Romans mined iron ore and precious metals, and during medieval times and later, mining of copper, lead, and silver was of great importance. Most Austrian deposits, however, are of small size, a consequence of the very complicated tectonics of the Alpine region, causing wedging out of ores and displacements by faulting. In 1982, there were only six operating metal mines in Austria, all located in the Alps. It is said that Austria is rich in poor deposits. Austria nowadays emphasizes the production of hydrocarbons, refractive and industrial minerals, and raw materials for construction purposes.

Iron and Steel.—Iron ore is surface mined at Erzberg, in the northern Greywacke zone of Styria, in central Austria. The mine is the largest surface operation in the country and the most famous iron ore deposit in Europe. The ore is bounded by Paleozoic limestones and occurs as siderite and anhydrite, with about 28% to 32% iron and 1.5% to 2.0% manganese. Proven and probable ore reserves amount to about 27 million and 166 million tons, respectively. At the present rate of mining, the ore may be depleted in 50 to 55 years. The entire yearly production of 3.0 to 3.5 million tons of concentrate is delivered to the Donawitz steel plant nearby. Although there are

many other occurrences of siderite in the Greywacke zone, no other minable deposits exist except for some specular hematite at Waldenstein in Carinthia that is used for rustproofing.

Austria's output of iron and steel continued to decline except for finished products and special steels. Practically all domestic steel companies operated at a loss. To keep the ailing steel industry alive, the Federal and State governments had given the companies about $432 million in aid by 1982; an additional $59 million was to be allocated early in 1983, reportedly to partially compensate the companies' losses in 1982 and 1983.

Voest-Alpine AG (VA), and Vereinigte Edelstahlwerke AG (VEW), both state-owned, were the only two Austrian companies producing specialty steels. VEW was the leading manufacturer of specialty steel, producing the following quantities in the last 5 years (in metric tons): 1978—262,000, 1979—300,000, 1980—242,776, 1981—197,240, and 1982—200,000 (preliminary). Comparable data for VA was not available. However, VA's overall crude steel output, which reportedly included about 90% commercial steel and 5% each of alloyed and unalloyed specialty steel, was as follows (in thousand metric tons): 1978—3,772, 1979—4,285, 1980—4,065, and 1981—4,149.

Of the total 4,258,000 metric tons of crude steel produced in Austria in 1982, 3,695,000 or 86.8%, was produced by the oxygen process, 466,000 or 10.9% was produced by the electric process, and only 97,000 or 2.3% was produced in open-hearth furnaces.

VA drew up a restructuring plan for 1983-84 for its Donawitz steelworks. The plan involved a cutback in raw steel output of about 25%, or to 900,000 tons annually. Two blast furnaces and a Linz-Donawitz (LD) furnace were to continue to operate. The plant was also scheduled to switch entirely to the use of domestic ore from the Eisenerz Mine in Erzberg, 16 miles away, which was scheduled to reduce production but would continue to produce. Although the iron content of the sideritic ore is only 31%, it has a low sulfur and phosphorus content.

Lead and Zinc.—Bleiberg, located west of Villach, is the only lead-zinc mine in Austria and dates back to the 12th century. The stratabound ore bodies are concentrated in a graben and can be traced for over 6 miles in the east-west direction. The ore is made up of galena and sphalerite and has been mined to a depth of 2,700 feet. All mining is underground and the ore is transported underground through an adit to a processing plant at the surface. The two main underground workings are linked by two tunnels, one is 5 miles and the other is 8 miles long. The total length of the underground tunnels, levels, and crosscuts is over 620 miles. The mines supply 50% of the country's lead and 90% of its zinc consumption. Average annual output is about 400,000 tons of ore, grading 6% to 7% in combined metal, with 1.7% to 4.5% lead and 4% to 8% zinc. An extremely low silver content of the galena is characteristic of this deposit.

The daily output of the concentration plant was approximately 24 tons of lead concentrates and 162 tons of zinc concentrates. After crushing, the sulfides were recovered by flotation, at a capacity of 40 tons per hour. The company has also started to rework tailings from the old dumps, which contain about 2.4% to 4.0% zinc. The lead and zinc concentrates are then transported south a short distance by truck to Arnoldstein for smelting. The smelter operates a unique rotary hearth developed by the company for treating the lead concentrates and battery scrap. With concentrates of 74% lead, about 24 tons of lead bullion are produced daily, at a direct-lead recovery of about 89%.

Tungsten.—Mittersill, located southwest of Salzburg, is the only producing mine in Austria, although scheelite occurs at four other localities. The scheelite deposit at Mittersill, discovered only 15 years ago, is the largest in Europe. The deposit is topographically and structurally separated by the Felber Valley (Felbertal) into two fields, the Ostfeld and the Westfeld. Ore is extracted by surface mining in the Ostfeld and by underground operations in the Westfeld. Surface mining in the Ostfeld is to cease in a few years because of ore depletion. The combined mine production in 1982 was about 210,000 tons of ore resulting in 1,400 tons of concentrate at an average grade of 0.65% WO_3 content. Ore reserves were estimated at about 5 million tons, at an average grade of 0.45% WO_3, corresponding with 22,000 tons of WO_3. The ore is processed in a nearby plant and the concentrate is sent to Bergla, south of Graz, for smelting.

NONMETALS

Anhydrite, Gypsum, and Salt.—Considerable reserves of gypsum and anhydrite are known in Austria. They are distributed along the base of the northern Calcareous Alps in the upper Permian evaporite facies. The deposits are genetically closely related to the salt deposits, which occur in the same stratigraphic horizon. Mining of salt in Austria is mostly by underground leaching. Most of the salt-bearing rocks are a mixture of clays and marls, with only a few layers of pure rock salt.

Magnesite.—Until about 1930, Austria had a worldwide monopoly in the mining of magnesite. At present, the magnesite industry is of great importance to the Austrian economy. All deposits are in the Alps and are of the crystalline magnesite type, contained in slightly metamorphosed Paleozoic dolomites. The deposits occur mostly in the Greywacke zone of Lower Paleozoic age. The chief producing mines are Hochfilzen in Tirol, Radenthein in Carinthia, and Breitenau and Veitsch in Styria. The most important deposit and mine are located in Hochfilzen, where mining started in 1960. The Hochfilzen ore is disseminated in fine-grained dolomite and sandstone, soft and in places porous, and exhibits primary sedimentary structures. The ore is surface mined at Burglkopf, crushed on the spot, and through a series of chutes, a conveyor belt, and two ropeways, is transported to the Hochfilzen plant. There it is processed, formed into bricks, and sintered. The company in 1982 exported about 96% of its production, mostly to European countries. It also imported magnesite from Turkey and Greece.

MINERAL FUELS

In 1982, Austria's legislature enacted two amendments to the Energy Management Law of 1976, thus fundamentally altering the law. The Energy Management Law of 1982 authorizes the Federal Government to decree energy control measures in case of an energy crisis. The law is applicable to crude oil, petroleum products, solid mineral fuels, gas, and electric power. It enables the Government to control the production, transportation, and storage of energy; establish quotas; and impose conservation measures. The Petroleum Stockpiling and Reporting Act of 1982, second amendment to the law, set forth stockpiling and reporting requirements for natural gas, bituminous coal and coke, crude oil, and a variety of petroleum products. The 1982 law no longer requires that subsidiary rulings must be published in the official newspaper "Wiener Zeitung" prior to enforcement.

The total primary energy requirements of Austria have been decreasing in recent years, by 0.6% from 1980 to 1981 and by 1.2% from 1979 to 1980. The rising costs of oil and gas imports constituted a major problem for the Austrian economy in 1982. For example, the price of heavy fuel oil consumed by industry from early 1979 to the second quarter of 1982 reportedly increased by 129%, and that of natural gas increased by 71% over the same period. The price of coal increased 31% and electricity increased 27%. Industrial energy use in 1982 was about 40% of total energy consumption.

Coal.—Lignite is the only type of coal mined today in Austria. The last underground brown coal mine, Fohnsdorf in Styria, was shut down in 1979 because it was uneconomical. The most important lignite district is Koflach-Voitsberg in western Styria, which produces about 1.7 million tons annually, or 55% of total production. The other two are the Salzach (Salzburg) and the Wolfsegg-Traunthaler (Upper Austria) districts, each producing about 500,000 tons annually. The latter district is the second largest in Austria, where mining had started in the 18th century; production there has been declining since 1964 and in 1982 was about 600,000 tons.

Oil and Gas.—Hydrocarbons in Austria occur in the Vienna Basin and in some parts of the Molasse zone of Miocene age in Upper Austria. Most of the production came from the area northeast of Vienna. Production of oil has been declining for the past 5 years and now stands at about 11 million barrels annually; production of gas has also been declining for the past 5 years and is now about 51 million cubic feet. Domestic production satisfied little more than 13% of Austria's oil and about 35% of its gas demand. Most of the imported gas came from the U.S.S.R., and oil came from Libya and Saudi Arabia. In addition to providing virtually all natural gas imports, the U.S.S.R. covered over 23% of Austria's crude oil imports in 1982 (against 22.7% in 1981), 37.8% of petroleum product imports (35.8% in 1981), and 57.8% of coal imports (53.6% in 1981). Overall, the centrally planned economy countries provided in 1982 nearly 50% of Austria's energy imports.

Austrian oil and gas deposits occur at a depth of between 1,500 and 18,000 feet. The deepest gas well was drilled in 1979 at Zistersdorf and reached almost 27,000 feet, the deepest well outside the United States. The cumulative production from 1930 to 1982 from the Vienna Basin amounted to about 595 million barrels of oil and 1,556 billion cubic feet of gas. Proven and probable oil reserves were at about 140 million barrels representing approximately 10 to 12 years of production, and the remaining gas reserves represent a mere 5 years' output. The Austrian state oil company, Österreichische Mineralölverwaltungs AG (OMV), operated 138 gas and 1,000 oil wells in 1982. The company produced 77% of all domestic oil and owned and operated the only refinery in Austria at Schwechat.

In 1982, Austria became the fourth country (after the Federal Republic of Germany, France, and Switzerland) to sign an agreement with the U.S.S.R. to import natural gas through the Yamal pipeline from the Urengoi Field in western Siberia. Starting in 1984, 52.9 billion cubic feet of Siberian gas is to be imported over the next 25 years. The agreement is for about one-half of the amount of gas originally considered.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Austrian schillings (S) to U.S. dollars at the rate of S17 = US$1.00, the average rate in 1982.

The Mineral Industry of Belgium-Luxembourg

By George A. Rabchevsky[1]

BELGIUM

In 1982, the Belgian economy did not recover from the recession that has plagued the Government for the past several years. In February, Parliament began an economic recovery program by granting emergency powers to the Government to redirect economic resources toward the corporate sector and reduce the budget deficit. Real wages, which had become almost the highest in the world, and consumer buying both fell during the year. Inflation was 8%, lower than expected, but still above the European average. The unemployment rate increased over the year to 11.5%, with 483,000 workers unemployed, the highest percentage in Europe. In Flanders, unemployment reached 20% and in Wallonia it reached 17.5%. Unemployment benefits in 1982 alone exceeded 3% of the gross national product (GNP). Following the February devaluation of the Belgian franc, the first since 1946, the competitiveness of Belgian industry in world markets grew significantly. Nevertheless, the GNP was still down slightly in 1982. Industrial production in 1982 increased by only 0.9% instead of the anticipated 2%. The largest gains were registered in the metalworking industries, with significant increases also in chemicals and textiles.

The ethnolinguistic, regional, and now legal division of the country was another problem for the Belgian economy. The long-underdeveloped (Dutch-speaking) Flanders to the north was surpassing the industrially obsolescent Wallonia (French-speaking) as the center of production and prosperity. Wallonia had therefore been declared a development area, entitling it to certain Government subsidies and incentives.

PRODUCTION

Belgian industrial production in 1982 declined slightly, with the oil and coal sectors declining significantly. The basic metals industry and the metalworking sectors fared less badly.

Production of minerals and metals in Belgium from 1978 to 1981 and estimates for 1982 are given in table 1.

Table 1.—Belgium: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal	3,579	4,593	4,272	3,406	5,187
Cadmium, smelter	r1,139	1,440	1,527	1,176	1,001
Copper:					
Blister:					
Primary[e]	9,000	1,500	700	500	500
Secondary[e]	46,900	47,800	49,300	47,500	47,500
Total	55,900	49,300	50,000	48,000	48,000
Refined, primary and secondary, including alloys	388,600	368,800	373,700	436,579	501,634
Iron and steel:					
Ore and concentrate thousand tons	43	--	--	--	--
Pig iron do	r10,728	10,776	10,536	9,816	7,831
Ferroalloys: Electric furnace ferromanganese do	87	90	85	90	90
Steel:					
Crude do	12,601	13,442	12,320	12,286	9,882
Semimanufactures do	r9,696	r10,356	9,552	8,880	7,364
Lead metal:					
Smelter:[e]					
Primary[3]	46,500	33,700	53,900	60,200	52,800
Secondary[4]	30,000	27,000	30,000	28,000	28,000
Total	76,500	60,700	83,900	88,200	80,800
Refined:					
Primary	76,000	65,200	75,900	73,900	63,730
Secondary[5]	49,040	48,212	52,008	36,032	36,000
Total[5]	125,040	113,412	127,908	109,932	99,730
Selenium[e] kilograms	60,000	60,000	60,000	60,000	60,000
Tin metal:					
Primary	3,295	r2,240	2,822	65	--
Secondary	1,901	r12,500	2,230	2,443	2,206
Total	5,196	r14,740	5,052	2,508	2,206
Zinc:					
Slab zinc:					
Primary	233,916	256,720	239,014	237,700	231,851
Secondary (remelted zinc)	7,600	9,100	10,200	12,706	9,000
Total	241,516	265,820	249,214	250,406	240,851
Zinc powder	32,904	28,300	30,100	e30,100	30,000
Other, nonferrous:					
Precious metals, unworked, n.e.s.[6] thousand troy ounces	29,732	29,732	56,931	37,563	33,237
Base metals, unspecified[7]	e2,576	NA	NA	NA	NA
NONMETALS					
Barite	--	--	e29,900	e39,900	39,900
Cement, hydraulic thousand tons	7,576	7,703	7,482	6,698	6,321
Clays: Kaolin do	120	120	120	53	53
Gypsum and anhydrite, calcined	183,492	192,936	174,088	154,425	165,000
Lime and dead-burned dolomite:					
Quicklime thousand tons	2,384	2,484	2,328	2,697	2,581
Dead-burned dolomite do	167	164	165	148	150
Nitrogen: N content of ammonia do	540	r530	541	588	548
Phosphates: Thomas slag, gross weight do	r928	1,052	893	496	470
Sodium compounds:					
Sodium carbonate	427,443	400,248	326,928	273,000	300,000
Sodium sulfate[e]	250,000	250,000	250,000	250,000	250,000
Stone, sand and gravel:					
Calcareous:					
Dolomite thousand tons	3,489	3,354	3,324	3,100	3,200
Limestone do	27,048	29,084	29,659	27,584	24,664
Marble:					
In blocks cubic meters	3,612	4,368	4,252	5,861	7,847
Crushed and other	5,508	456	756	313	108
Petit granite (Belgian bluestone):					
Quarried cubic meters	693,024	687,996	878,364	766,030	625,875
Sawed do	71,328	64,944	72,180	63,433	55,532
Worked do	11,856	18,725	9,735	8,848	8,254
Crushed and other do	554,160	673,334	955,333	807,071	610,166
Porphyry, all types thousand tons	5,374	5,926	5,653	5,099	5,033
Quartz and quartzite	315,179	244,580	222,863	193,417	216,643

See footnotes at end of table.

Table 1.—Belgium: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Stone, sand and gravel —Continued					
Sandstone:					
Rough stone including crushed thousand tons	2,303	2,504	2,279	2,024	2,038
Paving and mosaic stone	19,272	22,690	21,963	15,260	11,108
Sand and gravel:					
Construction sand thousand tons	7,981	8,286	7,595	6,513	6,349
Foundry sand do.	1,043	1,919	775	673	625
Dredged sand do.	923	NA	NA	NA	NA
Glass sand do.	1,602	1,825	1,997	1,853	1,712
Other sand do.	1,915	1,736	1,721	1,332	1,575
Gravel, dredged do.	5,566	4,976	4,452	4,500	5,229
Sulfur, byproduct:					
Elemental[e] do.	110	110	110	110	110
Other forms[e] do.	157	160	160	160	160
Total[e] do.	267	270	270	270	270
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	2,000	2,000	2,000	2,000	2,000
Coal:					
Anthracite thousand tons	628	511	375	321	262
Bituminous do.	5,963	5,614	5,949	5,815	6,276
Total do.	6,591	6,125	6,324	6,136	6,538
Coke, all types do.	5,748	6,450	6,048	6,004	5,217
Fuel briquets, all kinds do.	125	152	82	53	50
Gas:					
Manufactured million cubic feet	24,554	NA	25,000	25,000	[e]25,000
Natural do.	1,360	1,389	1,352	1,342	1,340
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	40,928	43,288	46,801	40,571	42,000
Jet fuel do.	11,968	12,120	13,656	14,264	[e]13,500
Kerosine do.	697	1,116	178	256	[e]250
Distillate fuel oil do.	80,038	88,043	75,704	65,469	[e]67,000
Residual fuel oil do.	72,114	62,045	61,672	55,648	[e]56,000
Lubricants do.	616	686	440	280	[e]300
Other do.	27,930	27,207	25,837	28,223	[e]26,000
Refinery fuel and losses do.	13,086	12,096	14,840	14,304	[e]14,000
Total do.	247,377	246,601	239,128	219,015	[e]219,050

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through June 22, 1983.

[2]In addition to the commodities listed, Belgium produces a number of other metals for which only aggregate output figures are available. These aggregates are included under "Other, nonferrous."

[3]Data not reported; derived by taking reported primary lead output plus exports of lead bullion minus imports of lead bullion.

[4]Data represents secondary refined lead output minus remelt lead: as such the figures are probably high, because they include some lead that was sufficiently pure as scrap and did not require resmelting, but data are not adequate to permit differentiation.

[5]Includes remelted lead, as follows in metric tons: 1978—21,000, 1979—21,200, 1980—22,000, 1981—8,000; and 1982—8,000 (estimated).

[6]Known to include gold and silver and may include platinum-group metals.

[7]Derived by subtracting aluminum data from a reported total for unspecified base metals.

TRADE

In the minerals sector, the United States, in 1982, imported $323 million[2] worth of iron, steel, and metals; $844 million worth of diamonds and jewelry; and about $50 million worth of various other mineral products from Belgium. Belgium imported $585 million worth of minerals, $327 million worth of diamonds and jewelry, and $159 million worth of other metals from the United States.

Table 2.—Belgium-Luxembourg: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium:				
Oxides and hydroxides	20	54	NA	France 25; United Kingdom 20.
Metal including alloys, all forms value	$2,429	$1,893	--	NA.
Alkaline metals	48	1	--	NA.
Rare-earth metals	4	(1)	--	NA.
Unspecified	17	126	--	Nigeria 100; Netherlands 22.
Aluminum:				
Ore and concentrate	1,787	654	--	France 598; West Germany 36.
Oxides and hydroxides	744	660	--	Netherlands 246; United Kingdom 227; France 120.
Ash and residue containing aluminum	7,647	7,457	NA	West Germany 6,533.
Metal including alloys:				
Scrap	36,800	38,469	58	France 17,103; West Germany 9,140; Netherlands 8,277.
Unwrought	19,582	29,666	--	West Germany 17,233; Netherlands 5,709; France 5,316.
Semimanufactures	219,828	228,810	13,017	France 47,777; West Germany 35,158; Netherlands 28,989.
Antimony:				
Ore and concentrate	50	3	--	NA.
Metal including alloys, all forms	10	264	NA	Poland 202; Venezuela 23.
Beryllium: Metal including alloys, all forms	--	3	--	NA.
Cadmium: Metal including alloys, all forms	870	575	68	France 248; West Germany 163; U.S.S.R. 5.
Chromium:				
Ore and concentrate	30	--		
Oxides and hydroxides	185	79	--	France 53; West Germany 10; Netherlands 6.
Metal including alloys, all forms	464	399	26	West Germany 106; France 80; United Kingdom 60.
Columbium and tantalum:				
Ore and concentrate	30	7	--	NA.
Ash and residue containing columbium and/or tantalum	--	2,721	--	West Germany 2,698.
Copper:				
Ore and concentrate	716	727	--	Netherlands 537; West Germany 108; Spain 73.
Oxides and hydroxides	605	1,059	NA	West Germany 328; Denmark 191; France 178.
Sulfate	9,219	8,997	NA	Netherlands 2,962; West Germany 2,401; Denmark 1,523.
Ash and residue containing copper	844	2,918	NA	France 1,716; West Germany 357; Spain 138.
Metal including alloys:				
Scrap	26,355	24,065	--	West Germany 10,583; France 4,646; Netherlands 3,441.
Unwrought	314,035	303,163	3,157	France 118,456; West Germany 80,619; United Kingdom 19,267.
Semimanufactures	278,474	244,364	2,861	West Germany 75,801; France 74,689; Netherlands 32,207.
Gold:				
Waste and sweepings value, thousands	$1,456	$3,484	--	Netherlands $1,755; United Kingdom $1,313.
Metal including alloys, unwrought and partly wrought thousand troy ounces	876	970	NA	Switzerland 526; United Kingdom 265; France 9.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	60,237	18,693	--	France 18,548; Netherlands 79; United Kingdom 33.
Pyrite, roasted	148,865	159,265	--	West Germany 147,078; Spain 10,138; United Kingdom 2,046.
Metal:				
Scrap	536,640	578,431	13	West Germany 209,198; France 126,436; Spain 87,356.
Pig iron, cast iron, related materials	r8,312	9,923	--	Norway 5,146; Denmark 1,434; France 974.
Ferroalloys:				
Ferrochromium	1,544	3,858	NA	West Germany 2,319; France 1,468.
Ferromanganese	37,281	12,129	--	France 5,762; West Germany 4,155; Algeria 900.
Ferromolybdenum	29,659	31,093	NA	NA.
Ferronickel	4	28	18	NA.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys —Continued				
Ferrosilicon	3,280	4,633	NA	West Germany 2,528; France 1,923.
Unspecified	2,180	3,434	355	West Germany 1,205; Czechoslovakia 888; France 390.
Steel, primary forms thousand tons	2,894	2,734	114	France 1,279; Italy 454; West Germany 411.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	4,078	3,524	448	West Germany 978; France 691; Netherlands 356.
Universals, plates, sheets do	5,123	5,021	379	France 1,181; West Germany 1,110; Norway 435.
Hoop and strip	789,589	599,413	3,052	West Germany 239,449; France 151,179; Switzerland 47,284.
Rails and accessories	82,065	85,848	12,016	France 33,750; Italy 8,261; India 3,509.
Wire	471,029	462,118	42,136	West Germany 92,169; France 67,873; Netherlands 46,124.
Tubes, pipes, fittings	362,227	357,671	76,785	France 68,367; West Germany 67,493; Netherlands 46,557.
Castings and forgings, rough	11,321	11,180	1,167	Netherlands 6,035; France 1,772; West Germany 922.
Lead:				
Ore and concentrate	8,058	—	—	
Oxides	5,638	3,332	1	West Germany 1,251; Netherlands 1,101; France 602.
Ash and residue containing lead	4,565	5,360	--	France 3,383; West Germany 1,786.
Metal including alloys:				
Scrap	16,718	13,417	--	France 5,464; West Germany 2,931; Netherlands 2,232.
Unwrought	84,262	79,578	784	Netherlands 24,930; West Germany 20,291; France 9,121.
Semimanufactures	7,792	8,486	10	Netherlands 5,071; Cuba 813; France 754.
Magnesium: Metal including alloys:				
Scrap	484	171	35	Netherlands 111; West Germany 24.
Unwrought	6	—	—	
Semimanufactures	2	16	--	Algeria 9; Switzerland 3; Burundi 2.
Manganese:				
Ore and concentrate, metallurgical-grade	5,929	8,333	--	Netherlands 7,881; France 287; Spain 47.
Metal including alloys, all forms	306	132	--	NA.
Mercury 76-pound flasks	577	412	--	Netherlands 267; Taiwan 46.
Metalloids:				
Arsenic and tellurium: Metal including alloys, all forms	7	10	--	France 6; United Kingdom 2.
Boron	(1)	2	--	NA.
Silicon	35	177	15	West Germany 100; Spain 8; Australia 3.
Molybdenum:				
Ore and concentrate	5,542	9,093	--	West Germany 2,221; United Kingdom 1,750; France 1,566.
Oxides and hydroxides	176	154	61	United Kingdom 42; France 18; Austria 10.
Metal including alloys, all forms	116	183	(1)	France 99; Netherlands 40; Sweden 20.
Nickel:				
Ore and concentrate	928	1	--	NA.
Matte and speiss	11	—	—	
Oxides and hydroxides	6	2	NA	NA.
Ash and residue containing nickel	1,947	7,957	--	Canada 5,326.
Metal including alloys:				
Scrap	1,440	1,432	207	India 645; West Germany 277; Netherlands 112.
Unwrought	312	120	--	West Germany 58; France 23; Switzerland 18.
Semimanufactures	1,002	352	1	West Germany 139; Netherlands 70; France 41.
Platinum-group metals:				
Waste and sweepings value, thousands	NA	$5,078	--	West Germany $3,896; United Kingdom $634; France $235.
Metal including alloys, unwrought and partly wrought, unspecified troy ounces	132,009	250,936	108,874	Netherlands 12,791; United Kingdom 7,698; West Germany 5,085.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Rhenium: Metal including alloys, all forms	1	(1)	--	NA.
Silver:				
Waste and sweepings[2] value, thousands	$14,852	$6,092	--	United Kingdom $5,406; West Germany $455.
Metal including alloys, unwrought and partly wrought thousand troy ounces	48,601	31,345	4,236	United Kingdom 18,052; West Germany 2,636; Switzerland 432.
Tin:				
Oxides	(1)	6	--	NA.
Ash and residue containing tin	2,116	2,291	NA	United Kingdom 1,827; Spain 274.
Titanium:				
Ore and concentrate	2,814	(1)	NA	NA.
Oxides	22,156	34,121	4,699	West Germany 11,010; Brazil 3,499; Italy 2,075.
Metal including alloys, all forms	110	103	3	France 19; Italy 14; Netherlands 14.
Tungsten:				
Ore and concentrate value, thousands	--	$2	--	All to West Germany.
Oxides and hydroxides	--	9	--	All to France.
Ash and residue containing tungsten	38	34	--	United Kingdom 17.
Metal including alloys, all forms	166	143	(1)	Netherlands 75; West Germany 52; Austria 5.
Uranium and/or thorium: Ore and concentrate	156	--		
Vanadium:				
Ore and concentrate	--	1	NA	NA.
Oxides and hydroxides	143	134	NA	West Germany 85; Czechoslovakia 49.
Ash and residue containing vanadium	--	4,775	--	West Germany 4,705.
Zinc:				
Ore and concentrate	25,108	41,367	--	All to France.
Oxides and hydroxides	5,054	5,547	--	France 1,161; Hungary 889; Romania 680.
Blue powder	17,390	15,547	NA	West Germany 8,364; Netherlands 1,898; Switzerland 1,317.
Matte	2,458	2,753	NA	France 1,327; West Germany 997.
Ash and residue containing zinc	37,365	27,583	NA	West Germany 17,072; France 9,965.
Metal including alloys:				
Scrap	6,202	11,500	--	France 5,069; Netherlands 2,957; West Germany 2,799.
Unwrought	168,178	148,552	12,198	West Germany 56,505; France 31,401; United Kingdom 6,521.
Semimanufactures	9,424	9,369	226	West Germany 6,486; France 469; Netherlands 166.
Zirconium:				
Ore and concentrate	180	16	NA	Poland 6.
Metal including alloys, all forms	--	2	--	NA.
Other:				
Ores and concentrates	72	202	NA	NA.
Oxides and hydroxides	r2,641	8,966	228	Netherlands 2,456; West Germany 430; France 208.
Ashes and residues	111,015	20,561	286	Netherlands 8,037; West Germany 5,902; France 2,886.
Pyrophoric alloys	--	47	--	NA.
Cermets	414	341	27	Austria 125; West Germany 103; Italy 12.
Base metal including alloys, all forms	15	13	3	United Kingdom 6.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,549	107	--	Netherlands 75; West Germany 15; Algeria 12.
Artificial:				
Corundum	550	693	--	France 348; Netherlands 303; West Germany 16.
Silicon carbide	773	991	NA	France 803.
Dust and powder of precious and semi-precious stones excluding diamond kilograms	1,827	689	164	Netherlands 124; Israel 93; United Kingdom 63.
Grinding and polishing wheels and stones	2,612	2,489	3	France 1,357; West Germany 418; Romania 221.
Asbestos, crude	56	221	--	Iran 71; Algeria 65; Netherlands 59.
Barite and witherite	13,657	19,278	10	Netherlands 16,172; United Kingdom 2,959; France 137.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Boron materials:				
Crude natural borates	20,727	18,347	--	Netherlands 12,166; West Germany 5,053; Austria 170.
Oxides and acids	453	348	--	West Germany 155; France 117; United Kingdom 49.
Cement thousand tons	2,928	2,979	9	Netherlands 1,451; West Germany 512; France 402.
Chalk	79,175	77,230	36	Netherlands 16,844; France 13,398; West Germany 12,326.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	402	964	NA	Netherlands 814.
Bentonite	10,831	--		
Chamotte earth	365	2,195	NA	NA.
Dinas earth	--	24	--	NA.
Kaolin	12,605	8,362	NA	Netherlands 2,670; West Germany 983; France 923.
Unspecified	9,090	8,976	1	Netherlands 5,374; France 479.
Products:				
Nonrefractory	291,533	241,980	145	France 83,380; West Germany 77,089; Netherlands 71,798.
Refractory including nonclay brick	109,687	87,943	591	France 39,667; West Germany 18,498; Italy 13,154.
Cryolite and chiolite	94	21	--	West Germany 20.
Diamond:				
Gem, not set or strung thousand carats	27,471	34,121	977	India 14,705; United Kingdom 12,101; Switzerland 2,586.
Industrial do	8,070	10,700	2,449	United Kingdom 4,617; Ireland 1,369; West Germany 523.
Diatomite and other infusorial earth	7,806	924	--	Netherlands 605; Iraq 108; France 95.
Feldspar, fluorspar, related materials:				
Feldspar	6,494	2	--	NA.
Fluorspar	4,926	4,697	--	West Germany 4,369.
Unspecified	97	557	--	NA.
Fertilizer materials:				
Crude, unspecified	29,042	28,283	NA	France 17,174; Netherlands 8,038; West Germany 2,823.
Manufactured:				
Ammonia	57,844	53,382	--	France 51,790; West Germany 723; Netherlands 237.
Nitrogenous thousand tons	1,804	1,907	42	France 730; West Germany 465; Netherlands 184.
Phosphatic do	1,532	1,107	--	West Germany 695; France 259; Switzerland 41.
Potassic do	662	595	12	France 135; Norway 82; Turkey 45.
Unspecified and mixed do	1,622	1,609	9	France 834; West Germany 201; United Kingdom 82.
Graphite, natural	24	298	--	United Kingdom 139; France 80; West Germany 64.
Gypsum and plaster	100,607	140,022	--	West Germany 83,059; Netherlands 54,255; France 1,248.
Halogens:				
Bromine	1,923	76	--	United Kingdom 70.
Chlorine	29,865	23,909	--	France 11,272; Netherlands 10,248.
Iodine	47	112	--	Spain 39; France 31; United Kingdom 26.
Unspecified value	$68	$81	--	NA.
Lime	761,665	693,732	(1)	Netherlands 529,057; West Germany 80,900; France 63,070.
Magnesium compounds: Magnesite	34,458	1,678	--	France 702; Netherlands 619; West Germany 149.
Mica:				
Crude including splittings and waste	65	38	--	France 12; West Germany 8; Italy 6.
Worked including agglomerated splittings	66	2	--	Brazil 1.
Nitrates, crude	19,788	12,555	NA	West Germany 6,045; Italy 3,707; France 1,971.
Phosphates, crude	11,291	14,779	NA	France 7,276; West Germany 3,919; Zaire 460.
Pigments, mineral:				
Natural, crude	30	120	NA	NA.
Iron oxides and hydroxides, processed	13,955	8,765	102	France 5,772; West Germany 893; Italy 659.
Potassium salts, crude	1,628	1,484	--	All to Netherlands.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural, gem material _ kilograms	207	353	8	West Germany 114; Switzerland 66; France 60.
Synthetic _____do_____	5,493	3,284	8	Republic of Korea 28; Netherlands 19; United Kingdom 10.
Pyrite, unroasted	32	193	--	France 73; Cuba 9.
Salt and brine	115,385	107,218	18	France 91,394; Netherlands 13,239; West Germany 1,499.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	10,840	10,326	2,245	Netherlands 4,790; Denmark 1,045; Bulgaria 440.
Sodium carbonate, natural and manufactured	54,393	11,862	--	France 6,536; Netherlands 2,914; West Germany 983.
Sodium hydroxide	421,029	548,930	20,247	Netherlands 286,115; France 80,050; West Germany 60,923.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	683,020	593,337	--	Netherlands 580,623; France 6,782; West Germany 4,519.
Worked	19,703	19,909	448	Netherlands 7,788; West Germany 6,348; France 3,430.
Dolomite, chiefly refractory-grade thousand tons	1,569	1,239	--	Netherlands 548; West Germany 447; France 230.
Gravel and crushed rock ___do____	8,910	8,534	(1)	Netherlands 4,166; France 3,895; West Germany 470.
Limestone other than dimension	553,260	550,226	--	Netherlands 314,645; France 234,323.
Quartz and quartzite	12,940	12,627	--	West Germany 7,864; Netherlands 1,804; France 1,680.
Sand other than metal-bearing thousand tons	3,422	2,984	(1)	France 934; Netherlands 741; West Germany 191.
Sulfur:				
Elemental:				
Crude including native and by-product	14,032	9,128	--	France 6,265; West Germany 635; Netherlands 457.
Colloidal, precipitated, sublimed	148	87	--	France 27; Netherlands 21; Venezuela 20.
Sulfuric acid	197,065	122,169	--	France 55,044; Republic of South Africa 11,793; Mexico 11,629.
Talc, steatite, soapstone, pyrophyllite	23,331	28,267	--	West Germany 5,526; France 3,421; United Kingdom 3,180.
Other:				
Crude	571,212	783,489	(1)	Netherlands 745,104; France 26,933; West Germany 787.
Slag and dross, not metal-bearing thousand tons	2,413	1,974	6	France 747; Netherlands 683; West Germany 532.
Oxides and hydroxides of barium, magnesium, strontium	617	171	--	France 78; West Germany 60; Mauritania 10.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	306,547	238,989	1,805	Netherlands 68,292; West Germany 49,661; France 46,945.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	16,435	5,698	--	France 3,598; Norway 1,804; Burundi 155.
Carbon: Carbon black	390	653	--	West Germany 274; France 174; Netherlands 99.
Coal:				
Anthracite and bituminous	538,043	892,933	--	West Germany 567,158; Netherlands 134,678; France 109,172.
Briquets of anthracite and bituminous coal	25,380	16,231	--	France 14,056; Switzerland 950; Iraq 250.
Lignite including briquets	38	31	--	Netherlands 22; United Kingdom 8.
Coke and semicoke	871,067	892,646	14,004	France 362,177; Romania 323,776; West Germany 106,654.
Gas, manufactured_ value, thousands	$1	$1	--	NA.
Hydrogen, helium, rare gases million cubic feet	(3)	1,134	NA	France 628; West Germany 329; Netherlands 58.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Peat including briquets and litter	2,257	2,476	--	Netherlands 1,351; France 657; United Arab Emirates 259.
Petroleum and refinery products:				
Crude—42-gallon barrels	12	427,437	427,430	Zaire 7.
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	3,115	3,328	--	Netherlands 2,040; United Kingdom 387; West Germany 260.
Gasoline —do—	40,635	33,533	207	West Germany 9,274; Switzerland 5,683; Netherlands 5,133.
Mineral jelly and wax —do—	31	40	3	France 12; Italy 5; United Kingdom 4.
Kerosine and jet fuel —do—	12,299	12,132	9	West Germany 3,756; Netherlands 1,183; Denmark 1,035.
Distillate fuel oil —do—	32,115	26,185	172	West Germany 11,910; Netherlands 4,606; Denmark 2,461.
Lubricants —do—	2,599	2,652	1	Netherlands 762; West Germany 242; France 197.
Residual fuel oil —do—	37,642	43,078	--	Netherlands 10,312; United Kingdom 6,271; West Germany 4,339.
Bitumen and other residues —do—	1,657	1,684	--	Netherlands 1,524; West Germany 61; Norway 57.
Bituminous mixtures —do—	81	88	(1)	Netherlands 37; France 23; Egypt 7.
Petroleum coke —do—	12	10	--	France 7; West Germany 2; Netherlands 1.
Tars and other crude chemicals derived from coal, gas, and petroleum	289,871	277,877	9,594	West Germany 100,509; France 81,296; Netherlands 42,611.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]1980 export was 51,432 tons.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Cesium and rubidium	--	11	--	NA.
Lithium:				
Oxides and hydroxides	255	133	20	West Germany 87; U.S.S.R. 25.
Metal including alloys, all forms	1	7	--	NA.
Alkaline metals	105	46	NA	France 45.
Rare-earth metals	21	1	--	NA.
Unspecified	33	7	--	NA.
Aluminum:				
Ore and concentrate	35,936	33,050	--	Netherlands 13,439; West Germany 6,948; China 5,454.
Oxides and hydroxides	21,519	23,635	974	West Germany 18,327; Netherlands 2,064; Italy 1,135.
Ash and residue containing aluminum	3,768	682	--	France 563; West Germany 69.
Metal including alloys:				
Scrap	33,316	39,095	1,246	Netherlands 14,170; France 9,703; West Germany 6,548.
Unwrought	252,500	244,955	1,225	Netherlands 118,950; West Germany 35,445; Spain 27,608.
Semimanufactures	86,054	83,911	1,060	West Germany 35,684; France 18,769; Netherlands 18,299.
Beryllium:				
Oxides and hydroxides value, thousands	$1	--		
Metal including alloys, all forms —do—	$27	$5	NA	NA.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Cadmium: Metal including alloys, all forms	1,028	1,131	NA	West Germany 293; Netherlands 224; Italy 139.
Chromium:				
Ore and concentrate	1,671	1,832	--	Netherlands 1,465; France 213; Mozambique 104.
Oxides and hydroxides	1,443	822	2	West Germany 742; China 40; Italy 20.
Metal including alloys, all forms	275	219	NA	West Germany 52; France 39; United Kingdom 34.
Cobalt:				
Ore and concentrate kilograms	--	100	--	NA.
Oxides and hydroxides	43	74	--	United Kingdom 49; France 15; West Germany 9.
Columbium and tantalum:				
Ore and concentrate	2,537	2,679	NA	Canada 2,429; West Germany 215.
Ash and residue containing columbium and/or tantalum	--	807	12	West Germany 795.
Metal including alloys, all forms, columbium (niobium)	3	6	--	West Germany 2.
Copper:				
Ore and concentrate	2,628	17,417	NA	Canada 11,975; Morocco 3,551; Peru 1,206.
Oxides and hydroxides	48	125	--	Italy 50; West Germany 39; France 22.
Sulfate	1,190	1,032	NA	Netherlands 356; France 224; West Germany 201.
Ash and residue containing copper	61,791	45,932	9,577	Sweden 12,884; France 6,485; West Germany 4,345.
Metal including alloys:				
Scrap	124,528	104,715	3,660	France 27,287; Netherlands 24,581; West Germany 14,788.
Unwrought	509,756	483,819	2,231	Zaire 289,533; Chile 31,368; Canada 24,945.
Semimanufactures	43,770	40,035	271	West Germany 21,683; France 8,656; Italy 5,211.
Gold:				
Waste and sweepings value, thousands	$4,838	$2,480	NA	Switzerland $1,080; Netherlands $1,048.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,856	16,983	5,869	West Germany 9,520; Switzerland 923; Netherlands 544.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	22,182	21,148	--	West Germany 4,660; Sweden 4,387; Brazil 3,786.
Pyrite, roasted	106,519	95,687	--	West Germany 72,946; Sweden 10,420; Norway 7,754.
Metal:				
Scrap	859,318	955,710	6,130	West Germany 388,411; Netherlands 369,310; France 135,081.
Pig iron, cast iron, related materials	117,389	97,653	31	France 51,388; West Germany 27,010; Canada 5,697.
Ferroalloys:				
Ferrochromium	27,588	25,474	NA	Netherlands 5,262; West Germany 4,527; Albania 3,478.
Ferromanganese	71,291	91,262	--	France 42,178; Norway 36,046; West Germany 12,394.
Ferromolybdenum	260	446	NA	West Germany 170; Netherlands 115; Italy 59.
Ferronickel	2,660	3,226	NA	France 1,468; Austria 688; Netherlands 591.
Ferrosilicochromium	1,340	1,527	NA	West Germany 750; Norway 537; France 240.
Ferrosilicomanganese	23,454	19,956	NA	Norway 13,210; Netherlands 3,770.
Ferrosilicon	32,584	38,202	NA	Norway 14,673; West Germany 13,431.
Unspecified	3,565	3,288	70	Brazil 820; France 804; West Germany 682.
Steel, primary forms thousand tons	1,036	889	4	Netherlands 342; West Germany 212; France 176.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	895,889	838,672	355	France 317,905; West Germany 240,434; Netherlands 124,901.
Universals, plates, sheets	652,236	625,351	3,239	Netherlands 228,174; West Germany 155,840; France 128,227.
Hoop and strip	117,904	114,131	12	France 55,043; West Germany 43,336; Netherlands 4,528.
Rails and accessories	46,856	25,508	(1)	France 23,363; West Germany 1,542; Netherlands 264.
Wire	61,667	56,074	51	West Germany 33,566; France 11,701; Netherlands 9,295.
Tubes, pipes, fittings	262,760	218,423	1,254	West Germany 75,907; Netherlands 51,601; France 41,918.
Castings and forgings, rough	66,709	73,353	1,519	France 26,165; Netherlands 21,393; West Germany 20,103.
Lead:				
Ore and concentrate	75,709	83,142	--	Peru 31,396; Australia 14,378; Canada 11,552.
Oxides	1,160	1,690	1	France 886; West Germany 663; Netherlands 135.
Ash and residue containing lead	52,520	61,288	8,599	Italy 17,425; France 9,368; Spain 6,439.
Metal including alloys:				
Scrap	11,944	7,520	44	Netherlands 4,575; Ireland 1,204; France 571.
Unwrought	54,286	41,234	1,582	France 17,169; Sweden 8,320; United Kingdom 6,500.
Semimanufactures	6,136	2,424	30	West Germany 1,792; Netherlands 349; France 238.
Magnesium: Metal including alloys:				
Scrap	36	96	3	Netherlands 46; West Germany 25; Nigeria 15.
Unwrought	1,404	1,633	186	Netherlands 437; France 239; Italy 190.
Semimanufactures	312	310	125	France 57; Austria 32; Switzerland 29.
Manganese:				
Ore and concentrate, metallurgical-grade	299,848	244,784	--	Republic of South Africa 98,015; Canada 48,620; Ghana 35,581.
Oxides	4,856	5,110	148	Greece 3,091; Ireland 1,200; Netherlands 298.
Metal including alloys, all forms	1,178	710	105	France 182; Netherlands 108; China 85.
Mercury 76-pound flasks	6,502	5,185	(1)	Spain 1,320; Netherlands 1,212; Finland 908.
Metalloids:				
Arsenic and tellurium:				
Oxides and acids	37	32	NA	NA.
Metal including alloys, all forms	100	90	NA	Sweden 53; United Kingdom 15; Netherlands 12.
Boron including alloys, all forms	2	--	--	
Phosphorus	402	234	17	Netherlands 64; France 59; United Kingdom 50.
Selenium	36	19	NA	Japan 11.
Silicon	514	642	1	France 404; West Germany 121; Spain 100.
Molybdenum:				
Ore and concentrate	15,992	20,772	NA	Canada 6,524; Netherlands 6,468; West Germany 2,120.
Oxides and hydroxides	17	120	NA	Netherlands 79; West Germany 3.
Metal including alloys:				
Scrap	--	10	--	All from West Germany.
Unwrought	40	27	NA	Netherlands 16; West Germany 7.
Semimanufactures	109	90	(1)	Netherlands 83; Austria 6.
Nickel:				
Ore and concentrate	(1)	25	--	All from West Germany.
Matte and speiss	300	446	--	Cuba 284; Netherlands 96; West Germany 41.
Oxides and hydroxides	164	106	NA	Netherlands 60; Canada 28; France 8.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel —Continued				
Ash and residue containing nickel	361	296	1	West Germany 153.
Metal including alloys:				
Scrap	519	983	--	Netherlands 346; Austria 345; West Germany 151.
Unwrought	3,061	2,450	273	Republic of South Africa 996; Netherlands 214; Philippines 184.
Semimanufactures	1,797	1,246	122	West Germany 675; United Kingdom 210; France 115.
Platinum-group metals:				
Waste and sweepings value, thousands	NA	$4,597	$542	Netherlands $3,085; France $378.
Metal including alloys, unwrought and partly wrought, unspecified troy ounces	85,970	91,524	15,441	United Kingdom 51,869; West Germany 20,460.
Rhenium: Metal including alloys, all forms value, thousands	$4	$9	NA	NA.
Silver:				
Ore and concentrate[2] do.	$19,713	$32,075	$8,642	Chile $11,408; Peru $8,847; Canada $3,178.
Waste and sweepings[2] do.	$207,732	$16,454	$10,265	Netherlands $3,207; United Kingdom $2,117.
Metal including alloys, unwrought and partly wrought thousand troy ounces	35,594	39,674	17,608	Netherlands 11,417; West Germany 1,929; United Kingdom 157.
Tin:				
Ore and concentrate	3,151	126	--	All from Peru.
Oxides	15	20	--	Netherlands 9; France 4; United Kingdom 4.
Ash and residue containing tin	869	645	193	Netherlands 401; Thailand 26.
Metal including alloys:				
Scrap	182	187	27	Netherlands 131; West Germany 12; United Kingdom 11.
Unwrought	2,988	2,744	226	Netherlands 992; Malaysia 414; Indonesia 258.
Semimanufactures	245	283	4	Netherlands 191; France 42; West Germany 38.
Titanium:				
Ore and concentrate	78,108	119,944	--	Canada 119,774.
Oxides	8,051	6,480	1,437	West Germany 2,208; France 1,572; Netherlands 796.
Metal including alloys, all forms	1,421	914	298	United Kingdom 264; France 237; West Germany 30.
Tungsten:				
Ore and concentrate	3	19	--	All from Netherlands.
Oxides and hydroxides	9	20	NA	China 12; France 5.
Ash and residue containing tungsten	31	1	--	NA.
Metal including alloys:				
Scrap	--	19	--	West Germany 13; Netherlands 6.
Unwrought	99	64	--	France 38; West Germany 23.
Semimanufactures	125	93	(1)	Netherlands 88.
Uranium and/or thorium:				
Ore and concentrate value, thousands	$128	$2,550	--	Chile $1,516; Canada $638; Netherlands $379.
Metal including alloys, all forms, uranium	2	4	--	NA.
Vanadium:				
Ore and concentrate	--	351	NA	Netherlands 301.
Oxides and hydroxides	1,535	1,542	NA	Republic of South Africa 487; China 387; Netherlands 190.
Ash and residue containing vanadium	7,001	9,350	17	Mozambique 6,785; West Germany 1,814.
Metal including alloys, unwrought	1	64	--	West Germany 32; Republic of South Africa 32.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	429,909	420,328	2,384	Canada 186,489; Peru 50,492; Sweden 37,886.
Oxides	6,465	7,330	63	France 2,289; Netherlands 2,169; United Kingdom 1,536.
Blue powder	652	494	NA	West Germany 293; Netherlands 134.
Matte	2,179	3,414	582	West Germany 1,644; France 588; Nigeria 79.
Ash and residue containing zinc	60,598	74,989	8,231	West Germany 31,029; France 15,662; Netherlands 8,108.
Metal including alloys:				
Scrap	6,618	6,756	155	Netherlands 3,198; France 1,346; West Germany 1,101.
Unwrought	45,576	45,598	6,310	Netherlands 20,147; West Germany 7,417; France 6,875.
Semimanufactures	21,333	20,216	2	France 18,429; West Germany 904; United Kingdom 542.
Zirconium:				
Ore and concentrate	2,431	4,793	NA	Netherlands 3,644; West Germany 497; United Kingdom 351.
Metal including alloys, all forms	124	190	26	France 85.
Other:				
Ores and concentrates	38,459	58,182	NA	Norway 57,934.
Oxides and hydroxides	r660	711	--	West Germany 488; France 45.
Ashes and residues	20,483	15,125	3,858	West Germany 278; France 221; Austria 218.
Pyrophoric alloys	30	14	--	NA.
Base metals including alloys, all forms	(1)	(1)	NA	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	40,854	10,968	73	West Germany 10,548; Italy 206; France 75.
Artificial:				
Corundum	6,410	6,372	55	West Germany 3,004; France 1,858; Austria 1,293.
Silicon carbide	6,342	3,175	NA	West Germany 1,592; Italy 693; Norway 497.
Dust and powder of precious and semiprecious stones, excluding diamond kilograms	2,633	2,950	1,144	Switzerland 602.
Grinding and polishing wheels and stones	3,470	2,971	140	West Germany 907; Austria 575; Italy 481.
Asbestos, crude	47,880	31,373	131	Canada 12,343; U.S.S.R. 7,688; Republic of South Africa 5,134.
Barite and witherite	8,407	8,004	--	West Germany 4,206; France 3,074; Netherlands 285.
Boron materials:				
Crude natural borates	94,187	76,321	3	Turkey 39,842; Netherlands 35,105; West Germany 1,335.
Oxides and acids	3,747	1,857	3	France 1,519; Turkey 185; China 80.
Cement	248,675	215,253	28	West Germany 124,663; Netherlands 77,092; France 9,998.
Chalk	124,705	119,025	--	France 100,804; Netherlands 17,615; West Germany 557.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	3,078	881	NA	United Kingdom 300; West Germany 172.
Bentonite	38,519	25,798	NA	Netherlands 10,838; Italy 8,898; West Germany 3,706.
Chamotte earth	111,226	77,653	4,737	West Germany 50,282; France 17,394.
Dinas earth	364	796	--	NA.
Kaolin	259,510	237,297	NA	United Kingdom 92,899; Netherlands 68,685; Japan 6,137.
Unspecified	141,124	108,260	NA	West Germany 81,866; Netherlands 11,513; France 9,339.
Products:				
Nonrefractory	504,370	391,590	3	West Germany 122,109; Netherlands 118,410; France 71,425.
Refractory including nonclay brick	164,058	165,235	4,261	West Germany 85,498.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Cryolite and chiolite	63	70	--	All from Denmark.
Diamond:				
Gem, not set or strung thousand carats	28,611	31,566	161	United Kingdom 19,618; Switzerland 5,079; India 630.
Industrial do	9,388	13,403	1,694	United Kingdom 3,050; Congo 2,488; Zaire 1,756.
Diatomite and other infusorial earth	9,039	8,368	683	France 4,585; Denmark 1,457; Spain 1,128.
Feldspar, fluorspar, related materials:				
Feldspar	35,564	28,294	--	France 23,945; Netherlands 1,529; Italy 896.
Fluorspar	16,876	12,128	--	France 3,221; Netherlands 3,088; East Germany 1,936.
Unspecified	25,243	29,561	--	Norway 25,347.
Fertilizer materials:				
Crude, unspecified	75,307	67,434	--	Netherlands 57,926; France 5,401; West Germany 2,307.
Manufactured:				
Ammonia	2,301	1,609	2	Netherlands 1,286; West Germany 298; Switzerland 20.
Nitrogenous	628,164	566,283	148,604	Netherlands 142,999; West Germany 122,797; France 113,767.
Phosphatic	124,648	97,428	44,247	Netherlands 35,400; France 7,825; Portugal 5,000.
Potassic thousand tons	1,134	991	--	West Germany 556; U.S.S.R. 225; East Germany 129.
Unspecified and mixed	365,432	291,894	96,262	France 80,571; West Germany 65,370; Netherlands 37,136.
Graphite, natural	5,832	6,493	38	Sweden 5,701; West Germany 453; Netherlands 234.
Gypsum and plaster	421,626	376,454	114	France 352,725; West Germany 15,162; Netherlands 8,392.
Halogens:				
Bromine	1,972	660	70	Israel 328; Netherlands 207.
Chlorine	21,741	10,205	(1)	West Germany 7,058; Poland 2,927; France 95.
Iodine	97	96	--	Japan 37; Chile 25; West Germany 19.
Unspecified	(1)	3	--	All from Netherlands.
Lime	91,982	85,373	8	France 78,449; West Germany 5,567; Netherlands 1,286.
Magnesium compounds: Magnesite	22,907	16,829	217	Italy 5,769; Netherlands 2,328; Austria 2,241.
Mica:				
Crude including splittings and waste	5,006	1,612	25	France 723; India 225; United Kingdom 167.
Worked including agglomerated splittings	78	117	(1)	Switzerland 61; West Germany 42; France 4.
Nitrates, crude	39,082	22,775	--	Chile 22,415; France 210.
Phosphates, crude thousand tons	2,326	2,252	330	Morocco 1,430; Togo 229; U.S.S.R. 134.
Pigments, mineral:				
Natural, crude	413	359	NA	NA.
Iron oxides and hydroxides, processed	7,276	6,320	191	West Germany 5,095; France 565; Italy 136.
Potassium salts, crude	34,260	67,434	--	Netherlands 57,926; France 5,401; West Germany 2,307.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material kilograms	14,469	5,664	184	France 562; Switzerland 274; Netherlands 232.
Quartz crystal, piezoelectric do	174	58	NA	NA.
Synthetic do	751	530	314	Switzerland 130; Ireland 41; Austria 18.
Pyrite, unroasted	189,433	207,879	--	Spain 196,703; Finland 3,480; Norway 2,899.
Salt and brine thousand tons	988	1,169	(1)	Netherlands 756; West Germany 376; France 24.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,150	1,621	--	West Germany 788; France 209; Spain 71.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s. —Continued				
Sodium carbonate, natural and manufactured	140,853	42,624	(1)	Netherlands 12,440; Bulgaria 12,265; West Germany 10,011.
Sodium hydroxide	110,070	132,124	2	West Germany 53,594; Netherlands 41,673; France 20,900.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	115,742	97,840	--	France 43,866; West Germany 23,648; Portugal 6,881.
Worked	117,702	91,866	(1)	France 24,246; Italy 23,347; Netherlands 18,184.
Dolomite, chiefly refractory-grade	51,454	41,718	--	West Germany 20,174; France 13,209; Netherlands 8,052.
Gravel and crushed rock thousand tons	9,139	7,396	(1)	Netherlands 3,942; United Kingdom 1,861; West Germany 845.
Limestone other than dimension	261,864	264,165	--	United Kingdom 233,960; France 25,269; West Germany 4,054.
Quartz and quartzite	111,753	86,769	149	West Germany 66,091; Norway 8,686; France 7,582.
Sand other than metal-bearing thousand tons	10,735	10,857	(1)	Netherlands 9,705; West Germany 747; France 209.
Sulfur:				
Elemental:				
Crude including native and byproduct	481,737	444,699	209,710	Poland 79,879; Canada 57,394; France 36,614.
Colloidal, precipitated, sublimed	1,353	1,936	2	West Germany 1,626; France 274; Sweden 16.
Dioxide	5,456	6,502	--	West Germany 4,455; France 1,476.
Sulfuric acid	446,096	527,119	1,143	West Germany 179,658; Netherlands 174,365; France 143,519.
Talc, steatite, soapstone, pyrophyllite	52,903	45,491	8,582	Australia 11,764; France 9,821; Norway 8,533.
Other:				
Crude thousand tons	1,110	623	2	France 218; West Germany 125.
Slag and dross, not metal-bearing do	1,115	1,399	--	France 880; Netherlands 387; West Germany 105.
Oxides and hydroxides of barium, magnesium, strontium	1,872	1,351	9	Netherlands 492; West Germany 405; East Germany 220.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	r73,362	64,365	129	West Germany 13,917; Netherlands 13,322; Czechoslovakia 13,037.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	94,981	69,981	316	France 60,504; Norway 8,751; West Germany 215.
Carbon: Carbon black	38,637	37,258	662	Netherlands 14,803; West Germany 13,382; France 5,060.
Coal:				
Anthracite and bituminous thousand tons	10,590	10,414	3,620	Republic of South Africa 2,853; West Germany 2,353; Australia 555.
Briquets of anthracite and bituminous coal	91,880	93,409	--	West Germany 79,441; France 11,480; East Germany 2,055.
Lignite including briquets	179,608	214,414	--	West Germany 210,070; Netherlands 3,805; East Germany 516.
Coke and semicoke thousand tons	3,614	3,029	64	West Germany 2,516; Netherlands 307; France 74.
Gas, natural million cubic feet	413,440	346,061	NA	Netherlands 279,261.
Gas, manufactured do	512	196	--	France 189.
Hydrogen, helium, rare gases do	(3)	152	13	Netherlands 100; West Germany 28.
Peat including briquets and litter	141,525	140,274	80	Netherlands 100,692; West Germany 29,482; U.S.S.R. 9,708.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	219,850	198,781	667	Saudi Arabia 129,848; United Kingdom 12,875; Iran 10,871.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	4,597	5,152	(1)	Netherlands 2,248; Saudi Arabia 857; United Kingdom 824.
Gasoline ---do---	22,720	15,438	(1)	Netherlands 8,278; United Kingdom 1,366; U.S.S.R. 1,354.
Mineral jelly and wax ---do---	148	145	1	West Germany 75; France 32; Netherlands 16.
Kerosine and jet fuel ---do---	676	951	(1)	Netherlands 872; France 42; West Germany 31.
Distillate fuel oil ---do---	20,712	24,877	(1)	Netherlands 16,282; U.S.S.R. 4,816; United Kingdom 1,785.
Lubricants ---do---	3,877	4,196	187	Netherlands 1,679; France 1,061; West Germany 593.
Residual fuel oil ---do---	35,163	31,505	30	Netherlands 13,246; U.S.S.R. 5,020; France 1,659.
Bitumen and other residues do---	291	323	(1)	France 146; Netherlands 129; West Germany 46.
Bituminous mixtures ---do---	190	115	2	France 52; Netherlands 41; West Germany 12.
Petroleum coke ---do---	795	938	767	Netherlands 65; West Germany 58; United Kingdom 43.
Tars and other crude chemicals derived from coal, gas, and petroleum	163,922	145,715	80	Netherlands 49,220; West Germany 43,955; France 29,735.

[r]Revised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]Total import for 1980 was 8,880 metric tons.

COMMODITY REVIEW

Metals.—*Copper.*—The most versatile Belgian multimetals smelter and refinery, Métallurgie Hoboken-Overpelt S.A., invested almost $35 million in 1982 in a new plant and equipment. The company planned to invest another $160 million in the next 5 years to upgrade and expand its production. Hoboken-Overpelt's second copper wire rod mill in Olen was expanded to 200,000 tons per year. Reportedly, the company's overall production of copper products increased to approximately 465,000 tons in 1982, from about 410,000 tons in 1981. The 1983 copper output was expected to be lower because of decreasing demand in the European market. The company also installed facilities for treating residues from its lead refinery at Hoboken to recover tellurium and indium, which should become operational in 1983. The rhodium concentrator and the refinery were also modernized in 1982, and two electric ovens were being installed at the Hoboken foundry to be used for the recovery of metals from the smelter residues. Production of cobalt continued to be low, while the production of extra-fine cobalt powder remained the same as that of 1981.

Iron and Steel.—The U.S. concern over foreign government steel subsidies for production and exports caused the U.S. Department of Commerce to initiate action against the steel industries of the European Economic Community (EEC), including Belgium. In its preliminary subsidy ruling Commerce determined that Belgium's Cockerill-Sambre S.A., for example, was subsidized by more than 20%, and Sidérurgie Maritime (Sidmar) was subsidized about 5%. Although the Belgian Government recognized the U.S. concern, it nevertheless felt its incentives to encourage new investments were valid. The EEC defended the expenditures as intended to reduce excess capacities and cut production by 1985, and not to subsidize EEC steel exports. About three quarters of Belgium's steel was exported in 1981, with 51% going to its EEC partners and 26% going to the developing countries. Sales to Eastern Europe had

dropped by more than 50% since 1978, but exports to the United States increased to 7.8% of Belgian steel output. A United States decision on the imposition of tariffs on Belgian and other European steel exporters was reached in October 1982, but was overtaken by an agreement that substantially reduced all European steel imports, including those from Belgium, beginning November 1, 1982, to continue through to the end of 1985.

The Belgian economy had been in a chronic recession since 1974, and its ailing steel industry had been a major drain on the public treasury. Reportedly, the steel industry had a net loss of $450 million in 1981, the equivalent of 18% of sales turnover. Wage costs rose 1.5% to $73 per ton of raw steel; raw materials and energy costs went up by 20%.

Despite early forecasts for improvement, Belgium's raw steel production in 1982 continued to drop for the third year, because of cutbacks in production capacity. The crisis dated back to the mid-1970's when the demand for steel declined as a result of global recession. By late 1975, Belgium's steel companies were in financial difficulties and banks refused to reschedule their loans. The Government intervened, providing temporary relief by buying their shares. The Belgian steel industry did not suffer from lack of modernization or lack of production capacity in 1982, but was afflicted by growing competition from new steel producers in developing countries.

In 1982, Cockerill-Sambre, Belgium's largest steel producer in the south (Wallonia), was in a state of uncertainty. A newly appointed managing director initiated restructuring in May, including a planned decrease in capacity by more than 50% to 6.1 million tons annually by 1985.

Restructuring continued also in the Belgian steel tube industry, with the Federal Republic of Germany's Benteler-Werke AG becoming a minor partner with the Belgian Government in Tubes de la Meuse S.A., a seamless tubemaker. The latter's welded-tube business was incorporated into Tubel S.A., a new company bringing together all of Belgium's producers of small-diameter welded-tube products.

A new Belgian stainless steel foundry was to be inaugurated in 1982. Founderies Mafotteaux S.A. and Société Regionale d'Investissement de Wallonie, were to spend $13 million to build and equip a new stainless steel foundry in Messancy in Luxembourg Province, as part of a $33 million investment plan. The foundry is to produce heavy stainless steel castings for export to foreign cement, coal, nuclear, and oil-processing plants. The Belgian specialty steelmaker, Laminoirs de Jemappes S.A., was turned down by the EEC in their application for state aid. The company, controlled by the Belgian Government and Tubes de la Meuse, wanted to modernize its plant, but assistance was rejected because it would include funds for an increased hot-rolling capacity.

Belgium's newly merged steel company, Cockerill-Sambre, had record losses in 1981. Accumulated debts were more than $1.7 billion, with a $340 million loss in 1981, 40% higher than the loss incurred in 1980. Approximately 56% of the loss was attributed to the Liège operations. The company employed 25,000 workers in 1982. In 1982, Cockerill-Sambre cut its production to less than 7 million tons in a move to avert financial collapse and to qualify for Government aid. The EEC was under pressure to reduce Belgian operating capacity even further because the bulk of the steel is exported, with only 25% being consumed domestically. Cockerill-Sambre was the sixth leading steel producer in the EEC, with a combined total annual capacity of 6.9 million tons of steel, 3.5 million tons of which came from Liège and 3.4 million tons came from the Charleroi region. The 1981 merger was unsatisfactory and various proposed realignments were considered in 1982. These included a revival of the idea of Benelux Steel Co. and a strengthening of the links between the Sambre half of Cockerill-Sambre, Saarstahl A.G., Aciéries Réunies de Burbach-Eich-Dudelange S.A. (Arbed), and Sidmar.

During the year, there were several investigations into Cockerill-Sambre to maintain its profitability. During the year, the McKinsey consulting group, commissioned jointly by the Belgian Government, the EEC, and the management of Cockerill-Sambre, recommended the closure of one of Cockerill-Sambre's two melting shops in Liège in an attempt to restore profitability. The group also recommended that Liège should concentrate on cold-rolled products, which were considered to be more profitable and easier to manage. The recommendations required a substantial investment and concomitant reductions in capacity and employment.

Steelworkers in Liège went on strike in March protesting, among other things, the EEC order to cut back further some of Cockerill-Sambre's lossmaking operations. The commission was refusing to approve the company's plans to maintain its annual raw steel capacity at 8.5 million tons. Financial aid was promised, however, if Cockerill-Sambre would cut its capacity to 6.5 million tons or less. The operation at Charleroi, which was not losing as much money as Liège, apparently accepted the need for further cutbacks, as did the Belgian economic affairs minister. By this time a report requested from the McKinsey firm of consultants on the Belgian steel industry was in its 12th version and recommended the closure of one of Liège's melting shops and a hot-strip mill. The report also recommended negotiations for closer links with the Netherlands Hoogovens Steel in production of wire rod. Charleroi was to close one of its section mills but was to expand hot-coil production in a reciprocal deal with Luxembourg's Arbed. The EEC rejected the company's restructuring plan because of unrealistic costs, but endorsed McKinsey's recommendations; it considered the approval of further financial aid, two-thirds of which would be for Liège.

Restructuring plans were finally announced at the end of May. Cockerill-Sambre's production capacity, which was reduced by more than 50% to 6.1 million tons, was expected to be profitable in 1985. The new plan was to divide the company into four operating units, with flat and nonflat products produced, at Charleroi and Liège. Talks with four foreign steelmakers from the Federal Republic of Germany, Luxembourg, the Netherlands, and France also resulted in a number of cooperative agreements on production sharing.

Late in the year, the Belgian Prime Minister together with Sidmar presented yet another proposal to solve Cockerill-Sambre's problems. In addition to a 10% average wage cut in Liège and a 6% cut in Charleroi, the plan also reduced Cockerill-Sambre's overall annual capacity to 5.5 to 6 million tons, meaning a cut of 5,700 jobs. Cockerill-Sambre was to become a holding company, its affiliates being granted a large measure of autonomy. Given cabinet agreement, the Flemish steel industry was to be guaranteed that no more national funds would go to the Walloon industry.

By the end of the year, Cockerill-Sambre had lost $170 million, which, combined with previous losses, accounted for $370 million out of the $460 million set aside to cover losses through the end of 1984, leaving only $90 million for operations in 1983.

Lead and Zinc.—Vieille-Montagne S.A. (VM) the largest of Belgium's three zinc producers, considered a merger in 1982 with Compagnie Royale Asturienne des Mines of France. Both companies were already linked through Société Générale de Belgique, which had a 28% stake in VM and 26% in Asturienne, and purchased concentrates for both. Their main plants were in France where both companies had large smelters. Neither company was contemplating any closures as a result of the merger. VM usually produces about 187,000 tons of zinc and 643 tons of cadmium.

Belgium's second-largest zinc producer, Hoboken-Overpelt, commissioned a new secondary zinc furnace at Overpelt late in 1981, with an annual capacity of 35,000 tons, treating low-grade copper-zinc scrap. No information was available on the progress and performance of the new smelter in 1982. Hoboken-Overpelt's 5,000-ton-per-year plant at Overpelt operated at no more than 60% of capacity and was reducing its work force by 125. The plant suffered because electricity costs, a major cost element, were 20% to 30% higher than for many of its European competitors.

Belgium's smallest zinc producer, Société Industrielle de Prayon S.A., shut down its unprofitable electrolytic plant at Ehein, near Liège, early in 1982 after it failed to sell the operation.

Nonmetals.—Belgium production of nonmetals in 1982 consisted mainly of barite, limestone, quartz sand, chalcedonic silica (silex), and sulfur. No major developments occurred in 1982 in those commodities, which were mostly exported through joint-venture companies.

Hoboken-Overpelt became one of the world's largest suppliers of germanium in 1982, with a new extraction unit at Olen with an annual capacity of 50 tons based on imported concentrates. Hoboken-Overpelt began production of germanium in 1953, mainly for use as a semiconductor element, but now used in infrared optics.

Mineral Fuels.—Belgium continued to be about 90% dependent on foreign energy resources and was the most vulnerable of the European countries in this regard. Coal is the only indigenous mineral fuel but it is too deep and too expensive to extract without heavy subsidies, and 65% of the supply

is imported. Belgium has, however, reduced its oil dependency to 47% of total energy consumption, a drop of 20% since 1972. Nuclear power generation in Belgium contributed a higher proportion of total energy than in any other European country.

The Belgian Government provided certain energy subsidies, especially to coal enterprises, in an effort to reduce costs of production and to keep the miners working. At the end of 1982, the Belgian Parliament was preparing recommendations for the Government on such matters as energy conservation and use of petroleum products, natural gas, coal, electricity, and nuclear energy. There still was no real energy conservation policy and the 1982 budget for conservation, for example, was reportedly only about $440,000.

Coal.—Because of poor geologic and mining conditions, coal extraction in Belgium was very difficult and unprofitable and continued to be subsidized by the Government. Reportedly, $1.4 billion was invested by the Government in the coal industry from 1981 to 1985 in the form of subsidies. Domestic coal production, mainly in Flanders (northern Belgium, Campine Field), was about 6 million tons in 1982, whereas domestic consumption amounted to about 16 million tons. No coal is exported. Major sources of imported coal, which amounted to about 11 million tons, were the United States, 35% of total imports; the Federal Republic of Germany, 23%; and the Republic of South Africa, 21%. The price of domestic coal was about 75% more than the imported coal, but the mines were kept open to provide employment. Over 50% of the Belgian coal production was consumed by the domestic steel industry. Because of the anticipated cutbacks in steel capacity and production, coal production was also expected to decline in the near future. The poor outlook for the coal industry prompted the coal lobby to support the construction of one or two coal-fired powerplants near the mines.

In addition to its domestic market, Belgium was a major coal-handling center for the rest of Europe. Various projects to modernize and expand coal port terminals have been accomplished and others were being considered.

Natural Gas.—In 1981, Belgium imported gas from three sources: Algeria, the Netherlands, and Norway. Until the expiration of the contract in the 1990's at least 85 billion cubic feet of gas is to be imported annually from the Netherlands; 7 billion cubic feet comes from the Norwegian Ekofisk Field, but these deliveries will cease by 1995-98. From November of 1982 through 1985, Belgium was also to receive 88 billion cubic feet of gas annually from Algeria, and 194 billion cubic feet annually from 1986-2002. Because of high prices and quantities, the Belgian Government attempted unsuccessfully to renegotiate the contract, especially since the estimated annual gas demand was revised downwards, to 283 billion cubic feet from 353 billion cubic feet, through 1990.

Belgium did not purchase any gas from the U.S.S.R. in 1982. The Belgian gas distributor, Distrigaz, was, however, negotiating with the U.S.S.R.'s Soyuzgazexport for import of up to 18 billion cubic feet of gas annually starting in 1985.

Nuclear Power.—Belgium continued to depend heavily on nuclear power for the generation of electricity, amounting to 25% of the total, which was to expand to 50% when the eight power stations were completed. Two older plants and two joint ventures with the French nuclear industry already provided 1,376 megawatts. Two new plants, with a total capacity of 1,880 megawatts, were put online in 1982. By 1985, the last two reactors under construction, with a total capacity of 2,960 megawatts, were scheduled to be operational. Two additional nuclear powerplants were also being planned; the cost of nuclear power was reportedly about 30% cheaper than electricity from coal-fired powerplants.

Petroleum.—In 1982, imports of Saudi Arabian crude accounted for 46% of total Belgian crude oil imports. Libya, Nigeria, and the U.S.S.R. were the other most important suppliers to Belgium with 9%, 8.2%, and 6.9% of total crude imports, respectively.

LUXEMBOURG

The Grand Duchy of Luxembourg is a member of the Belgium-Luxembourg Economic Union and shares exchange rates and customs facilities with Belgium. The country's industrial sector was dominated by steel, but in 1982 was being diversified by new high-technology investments. The country continued to be an active proponent

of free trade. Imports, for example, provided almost 90% of the consumer goods. Most trade was with Belgium, France, and the Federal Republic of Germany. Trade with the United States amounted to only about 4% of total foreign trade, although the United States was an important market for Luxembourg steel.

Metals.—*Aluminum.*—Luxembourg does not produce aluminum. In 1982, however, Luxalum S.A., a subsidiary of the U.S. company, National Aluminum Inc., itself a subsidiary of the fifth largest steel company in the United States, National Steel Corp., was going ahead with the construction of an aluminum sheet plant. The scheduled construction took place despite some opposition expressed by the EEC, in that there was already an excess capacity in the European aluminum sheet sector. The new plant, due to come onstream in January 1984, would be able to produce sheets more than 3 feet wide and with a gage of less than 7 micrometers. Production was expected to reach 15,000 tons by the end of the first year, possibly reaching 30,000 tons in the future. Reportedly, the Luxembourg Government was deciding on the matter and was willing to finance the project under the domestic economic framework law for developing sectors. There would also be a long-term loan from private banks.

In a related development, Luxembourg's Galvalange A.S., a joint venture between Arbed and Belgium's Phoenix Works, began production in July 1982 of aluminum-zinc coated sheets (Aluzinc), developed by Bethlehem Steel Corp. of the United States. Sweden was the only other producer of Aluzinc in Europe. The Galvalange plant, located near the steelworks at Dudelange, had a capacity of 220,000 to 230,000 tons per year. As the sole licensee in the EEC it could take 40% of the market in the future.

Iron and Steel.—The iron and steel industry remained the most important sector in the economy in 1982. Arbed was the sole iron and steel producer. Faced with the same problems as other steel producers throughout the world, Arbed had cut back its production and employment over the last 6 years. Despite the cutbacks, however, the company still employed nearly 25% of the industrial work force and 10% of the total work force, and produced more than 25% of the total domestic product of the country. Although improvements in productivity and costs continued, company losses were still mounting in 1982. In the years since the founding of the company in 1911, Arbed had become the 4th largest steel producer in Europe and the 10th largest in the world.

Nonmetals.—Although Luxembourg imported most of its industrial mineral requirements, and usually in a finished form, the country produced sandstone, limestone, sand and gravel, and small amounts of dolomite, gypsum, and slate.

At the last count, there were eight companies producing sandstone, mainly for aggregate, mostly located to the north and west of the capital. Carrières Feidt Sarl was the largest operator, with quarries at Rockange, Altwies, and Enzen. The greater part of Luxembourg's sand and gravel output was dredged from the Moselle River, near Remerschen and Wintrange. There was also some land-based production at Folschette. There were three sand and gravel companies in operation in 1982.

Dolomitic limestone was produced by three companies; Intermoselle Sarl was the largest. Large quarries were located at Moersdorf, Wasserbillig, near the German border, and at Schengen. Gypsum was produced by Platrieres Irthium Sarl just north of the city of Luxembourg, with an annual capacity of 2,000 tons. Apart from the concrete producers, Luxembourg, in general, had little in the way of large consumers of industrial minerals. Refralux Sarl of Luxembourg is the country's major manufacturer of refractory materials, serving the Arbed steel group. The company's principal product was dolomitic bricks that were made primarily from material imported from Belgium. Production declined 42,146 tons in 1979 to about 40,000 tons in 1982, owing to the fall in demand from Luxembourg's steel industry.

Mineral Fuels.—Luxembourg has practically no indigenous energy resources, and in 1982 the energy policy remained essentially unchanged: diversification of energy sources, fuel switching away from oil, strengthening of the distribution infrastructure, and the continuation of rational use and control of waste.

The steel industry consumed more than one-half of Luxembourg's energy supply, which to a large extent was integrated with the supply system of its neighboring countries. Oil was imported mainly from Belgium (85%), while the rest came from the Federal Republic of Germany, France, and the Netherlands. Natural gas was supplied through long-term contracts with the

Netherlands, the steel industry being the largest consumer. Most of Luxembourg's coal was imported from the EEC countries, predominantly the Federal Republic of Germany. Electricity was supplied by Belgium and the Federal Republic of Germany.

[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Belgian francs (BF) to U.S. dollars at the 1982 average exchange rate of BF50=US$1.00.

Table 4.—Luxembourg: Production of mineral commodities[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Cement, hydraulic	311	318	325	300	300
Gas, manufactured: Blast furnace (0.026 teracalorie per million cubic feet) million cubic feet	217,000	213,000	200,000	200,000	200,000
Gypsum and anhydrite, crude tons	990	1,044	856	900	900
Iron and steel:					
Ore and concentrate	835	[r]630	560	429	400
Pig iron (including blast furnace ferroalloys)	3,721	[r]3,801	3,568	2,889	[p]2,587
Steel:					
Crude	4,790	4,950	4,619	3,790	[p]3,510
Semimanufactures	3,800	3,931	3,746	3,400	[p]2,952
Phosphates: Thomas slag, gross weight	771	730	677	[e]700	700
Sand and gravel:					
Foundry sand tons	2,771	1,400	--	--	--
Other sand except glass sand	615	747	709	700	700
Gravel	213	229	216	200	200
Stone:					
Construction:					
Crushed thousand cubic meters	715	745	674	700	700
Dimension:					
Rough cut do	7	4	[3]14,600	[3]14,000	[3]14,000
Facing thousand square meters	3	4	4	4	4
Finished cubic meters	72	90	282	200	200
Flagstone:					
Polished square meters	4	4	[3]590	[3]600	600
Rough tons	1	([4])	297	300	300
Paving stone thousand pieces	14	--	--	--	--
Slate slabs do	1,363	1,171	1,212	1,200	1,200
Industrial:					
Dolomite	271	294	385	300	300
Limestone tons	169,036	140,950	--	--	--
Quartz, quartzite, glass sand do	20,550	79,600	21,000	20,000	20,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 22, 1983.
[2]In addition to the commodities listed, refractory clays and manufactured phosphatic fertilizers other than Thomas slag are produced, but data are not published, and information is inadequate to make reliable estimates of output levels.
[3]Unit changed to metric tons.
[4]Less than 1/2 unit.

The Mineral Industry of Bolivia

By Pablo Velasco[1]

Bolivia has been experiencing a series of worsening economic crises since 1977. The situation has been made worse by a series of military coups that interrupted two electoral processes intended to return power to civilians. This political instability and labor unrest has combined with the worldwide recession and the adverse conditions in world mineral markets to devastate the Bolivian economy. The gross domestic product (GDP) declined an estimated 7.4% in 1982, compared with that of 1981, to the equivalent of 17,703 million pesos[2] calculated at 1970 prices.

The rate of inflation increased from 52% in 1981 to 300% in 1982, one of the highest in Latin America. The country's foreign exchange earnings from all exports declined 10.3% from $978.2 million in 1981 to $877.7 million in 1982. Foreign debt obligations were estimated to require 60% to 70% of Bolivia's total export earnings, causing a severe shortage of available dollars in the local economy.

Minerals and hydrocarbons led Bolivia's exports with minerals accounting for 48% of the value of the nation's foreign revenue and natural gas, 43%. The production value of tin accounted for 66% of the total value of the nation's mineral exports, a 19% decline compared with the 1981 value. Production of tin as well as most other minerals declined. Total earnings from metal production were $247.5 million in 1982, a 14% decrease compared with that of 1981 and representing 59% of the total minerals export value.

The state-owned Corporación Minera de Bolivia (COMIBOL) was the largest Bolivian tin producer and accounted for 67% of the total tin produced, despite a production drop of 14%, compared with that of 1981. The second largest tin producer in the country was the medium-miner group, which produced 23% of the nation's total tin output; the small-miner group accounted for 10%.

The hydrocarbon sector's share of total Bolivian GDP was 1.4% in 1980, 1.1% in 1981, and an estimated 1.4% in 1982. It also contributed 45% of the total export value, principally because of natural gas exports to Argentina. The contribution of crude oil exports to the Bolivian economy during 1982 was insignificant, with only limited amounts of refined gasoline exported.

The future of the Bolivian economy, over at least the next decade, will depend on the foreign exchange earnings from the two traditional export sectors, the mining and hydrocarbons sectors, primarily natural gas.

Government Policies and Programs.—On February 2, 1981, the Ministry of Mines and Metallurgy presented, for the Government of Bolivia's consideration, the Mining-Metallurgy Policy for 1981-90. After a short analysis, the Supreme Decree No. 18509 was approved by the Government on July 23, 1981, as the policy to be followed over the next decade by the National Planning and Development Council.

The final approved Mining-Metallurgy Policy incorporated 16 policy elements and a 5-year mining development plan (1981-85). The 5-year plan lists a series of needed projects and investments divided into three areas: (1) exploration ($127.0 million); (2) exploitation ($130.0 million); and (3) beneficiation ($380.0 million). The 16 policies approved by the Government covered the entire spectrum of the mining industry.

Early in the year, the Bolivian Government introduced several exchange control

measures to comply with International Monetary Fund (IMF) recommendations that were prerequisites to providing a $120 million loan for balance-of-payment support. The first, on February 5, involved devaluing the Bolivian peso from 25 to 44 pesos to the dollar. The next action, on March 22, involved setting the official exchange rate at 44 pesos to the dollar for Government transactions and a floating exchange rate, determined by supply and demand for all private sector needs. In late 1982, the IMF reviewed the Bolivian economic situation and made further recommendations involving Bolivia's large public deficit and present Government expenditures. On November 6, the new civil Government of Bolivia implemented the proposed IMF package of economic measures, aimed to stimulate the economic recovery of the country. The latest corrective economic measure, recommended by the IMF (Supreme Decree 19250) through the Central Bank, fixed the exchange rate at 195.99 Bolivian pesos for the purchase of U.S. dollars and 200.00 pesos for the sale of U.S. dollars.

Gold regulations were updated to guarantee that all gold output in the country should be delivered to the Central Bank. Export of gold by private concerns was prohibited.

Bolivia decided to become a member of the Association of Tin Producing Countries (ATPC). The aims of ATPC were to foster the marketing of tin, increase research efforts, and defend prices through a special fund and export controls. The private sector in Bolivia has also played a leading role in the area of price protection and is one of the founders of the International Association of Tungsten Producers and a member of the Antimony Producers Committee.

The Servicio Geológico de Bolivia (GEOBOL) continued its program of basic regional geological mapping (1:50,000 maps), which was limited by the funds available to 4,500 square kilometers. The mineral exploration project of eastern Bolivia, known as Proyecto Mineralógico del Pre-Cámbrico, was a bilateral technical cooperation program undertaken by GEOBOL and the British Institute of Geological Science to make a rapid and systematic study of the geology and mineral potential of that part of the Precambrian Brazilian Shield, which covers an area of about 220,000 square kilometers within eastern Bolivia. The project began in July 1976 and was initially divided into two phases: phase 1 (1976-78), south of latitude 16°00; and phase 2 (1980-83), north of it.

The most significant discovery during the exploration survey was made in the Cerro Manomo area, 95 kilometers north-northeast of the village of San Ignacio de Velasco, where important phosphate (apatite), rare earth, thorium, columbium, uranium, barium, tin, molybdenum, and other mineralization occurs. A second major discovery was the Rincón del Tigre Igneous Complex, 100 kilometers northwest of the village of Puerto Suarez, where chromium, copper, and nickel-rich minerals have been found.

PRODUCTION

Tin output dropped to 26,773 tons, its lowest level in 16 years. In this recession, Bolivia's dependence on tin production grew even greater, amounting to 66% of the total Bolivian mineral export value, compared with 63% in 1981 and 61% in 1980. Fundiciones de Estaño Oruro's volatilized tin powder production declined 24% to 52 tons per year, compared with 1981 output. Production of hydrocarbons increased 19% to $398.4 million in export value, compared with 1981 value.

Output of most other minerals also declined compared with that of 1981.

Table 1.—Bolivia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS[3]					
Antimony:					
Mine output, metal content	13,337	13,019	15,465	15,301	[4]13,978
Metal	2,391	2,500	5,099	5,116	1,820
Arsenic, mine output, white arsenic equivalent[e]	--	--	81	127	[4]156
Bismuth:					
Mine output, metal content	307	10	11	11	[4]5
Metal	292	--	41	6	[4]18
Cadmium, mine output, metal content[5]	93	90	173	165	[4]134
Copper, mine output, metal content	2,853	1,797	1,884	2,637	2,270
Gold, mine output, metal content[6] troy ounces	24,660	30,319	52,075	66,372	[4]40,146
Iron ore:[7]					
Gross weight	55,450	25,000	5,600	6,477	[4]7,832
Metal content	35,313	15,900	3,570	4,113	[4]4,891
Lead:					
Mine output, metal content	18,039	15,359	17,747	16,757	[4]12,433
Metal including alloys	489	588	500	232	[4]236
Manganese ore:					
Gross weight[e]	1,237	10,500	[r]924	543	120
Metal content	371	3,150	[r]425	250	[4]55
Silver, mine output, metal content thousand troy ounces	6,285	5,742	6,099	6,394	[4]5,472
Tin:					
Mine output, metal content	30,881	27,648	[r]27,291	29,830	[4]26,773
Metal, smelter	16,254	14,950	18,191	20,005	[4]19,032
Tungsten, mine output, metal content	[r]2,437	[r]2,470	[r]2,732	2,779	[4]2,534
Zinc, mine output, metal content	53,923	51,621	50,260	47,029	[4]45,667
NONMETALS					
Barite	[7]2,889	[7]2,228	8,694	2,130	[4]607
Calcite	--	--	297	271	[4]267
Cement, hydraulic	254,254	251,000	[r]296,223	374,862	[4]324,923
Feldspar-related minerals: Sodalite	NA	NA	--	2	[4]1
Gypsum, crude	[e]1,000	[e]1,000	1,200	748	[4]756
Salt[e]	10,000	10,000	10,000	10,000	10,000
Sulfur	14,229	15,000	11,244	10,202	[4]5,914
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	154,769	159,961	168,818	175,478	[4]187,848
Marketable do.	61,297	[r]69,294	[r]78,632	86,085	[4]81,116
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	40	--	768	768	[4]766
Liquefied petroleum gas do.	815	820	[e]850	NA	[4]278
Petroleum:					
Crude do.	11,844	10,174	8,704	8,091	[4]8,921
Refinery products:					
Gasoline do.	4,133	4,472	3,684	3,330	3,090
Jet fuel do.	605	541	713	704	[4]536
Kerosine do.	1,169	1,033	1,021	725	[4]898
Distillate fuel oil do.	1,847	1,830	1,587	1,390	[4]1,565
Residual fuel oil do.	1,525	720	97	87	[4]161
Lubricants do.	100	156	181	150	[4]171
Liquefied petroleum gas do.	292	355	584	1,112	[4]1,376
Unspecified do.	36	[8]1,771	[8]1,898	1,360	1,500
Refinery losses[9] do.	108	73	12	9	8
Total do.	9,815	10,951	9,777	8,867	9,305

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 8, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (clays, crushed and broken stone, dimension stone, and sand and gravel) are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Unless otherwise specified, data represent actual production by COMIBOL and small- and medium-scale mines.

[4]Reported figure.

[5]Cadmium contained in zinc concentrates produced by COMIBOL. (Cadmium is not recovered in elemental form in Bolivia.)

[6]COMIBOL output plus sales by placer mines. (Small- and medium-scale mines cannot legally export gold.)

[7]Data represent exports and are regarded as being virtually equal to production.

[8]Includes topped crude (presumably further processed outside of refineries reported in this table or used without further processing) as follows, in thousand 42-gallon barrels: 1979—669 and 1980—481.

[9]Refinery fuel not reported separately, if at all, in recorded data.

Table 2.—Bolivia: Principal minerals produced by COMIBOL and medium and small miners

(Metric tons of fine content, unless otherwise specified)

Commodity	COMIBOL		Change, percent	Medium miners		Change, percent	Small miners[1]		Change, percent
	1981	1982	1981-82	1981	1982	1981-82	1981	1982	1981-82
Antimony	--	366	--	12,155	10,182	-16	3,141	3,430	+9
Bismuth	9	5	-44	--	--	--	2	--	--
Cadmium	122	93	-24	43	40	-7	--	--	--
Copper	2,623	2,266	-14	--	--	--	14	4	-71
Gold, troy ounces	--	--	--	16,075	[2]4,899	-70	50,298	35,247	-30
Iron	--	--	--	--	--	--	[3]4,113	4,891	+19
Lead	9,598	7,226	-25	4,359	4,019	-8	2,799	1,189	-58
Manganese	--	--	--	--	--	--	250	55	-78
Silver, thousand troy ounces	5,493	4,204	-23	787	760	-3	322	508	+58
Sulfur	--	--	--	--	--	--	10,202	5,914	-42
Tin	20,828	17,910	-14	6,335	6,026	-5	2,638	[4]2,836	+8
Tungsten[5]	1,424	1,252	-12	1,765	1,576	-11	260	367	+41
Zinc	27,218	23,726	-13	17,731	19,063	+8	2,079	2,878	+38

[1]Includes production of Banco Minero de Bolivia and others plus Empresa Nacional de Fundiciones domestic sales of tin and antimony.
[2]Includes production only of South American Placers Inc.
[3]Exports in February and September 1981.
[4]Includes 15 metric tons preconcentrates of COMIBOL for volatilization.
[5]Includes only wolframite and scheelite.

TRADE

Bolivia's mineral export earnings, which made up 48% of the country's foreign revenue, declined 25% to $419.3 million compared with 1981 earnings. The production value of tin, of which Bolivia is the world's fourth largest producer, fell 19% to $278.3 million.

The production value of natural gas, mainly for export to Argentina, increased 17% to $382 million, compared with 1981 value. The production value of natural gas continued to be second in importance, providing 43% of the country's foreign revenue. The overall export value of the country's traditional and nontraditional exports fell 10.3% to $877.7 million in 1982.

Refined gasoline export earnings have fallen from $163.9 million in 1974 to $3.3 million in 1981 and $4.5 million in 1982. Sales of natural gas to Argentina increased 4.6% to 81,116 million cubic feet compared with that of 1981.

Bolivia, although not a member of the International Tin Agreement, was restricting its exports in agreement with pact members.

COMMODITY REVIEW

METALS

Antimony.—Bolivia, the largest antimony producer in the world, reduced its output to 13,978 tons of metal in concentrates. Empresa Nacional de Fundiciones (ENAF) produced 1,820 tons of metal, a decline of 64% from that of 1981. Bolivia's antimony exports declined 39% in volume and 48% in value, compared with those of 1981. Most of the output was from the private sector with about 300 medium- and small-scale producers. Empresa Minera Unificada S.A. (EMUSA) was the largest Bolivian antimony producer, followed by San Juan Ltda., Churquini Enterprises Inc., Cía. Minera del Sur S.A. (COMSUR), and Bernal Hermanos. The medium-miner group accounted for 73% of national output; the small-miner group, 25%; and COMIBOL, the remainder.

For the last 3 years, antimony prices have experienced a continuous fall owing to increased recycling and the substitution of lower priced metals for antimony. Bolivia's state-run antimony smelter, ENAF, has been going through a process of change. ENAF stopped the production of antimony trioxide because it could no longer compete with other countries, which produced almost pure trioxide (99.9%). The smelter instead produced crude oxides, which it sold to foreign smelters.

The antimony smelter produced almost 5,200 tons in 1981, which was about 80% of capacity. However, in 1982, it ran at a very low capacity because prices had been too low to make full-scale operation worthwhile. The smelter stopped producing early in the year. The only operations conducted for the rest of the year were the treatment of material in the circuit and test runs to check costing. Part of the plant was used for tin smelting.

Copper.—The production of copper in Bolivia was very minor compared with that of the neighboring countries of Chile and Peru. During 1982, the production of copper was limited to COMIBOL'S Empresa Minera Corocoro and two or three small mines located in the Province of Uyuni.

The nation's copper output declined 14% to 2,270 tons compared with that of 1981. Nearly all of this was exported to the United States. Exports of copper totaled 2,139 tons grading 56% copper, valued at $3.1 million.

Gold.—Gold production in Bolivia decreased 40% compared with that of 1981. Small miners produced 88% of the total output. These small miners consisted of mining cooperatives with operations on the Tipuani River, located 120 kilometers north of La Paz. The remainder of the gold output came from the South American Placers Inc. dredge on the Kaka River.

EMUSA and a U.S. company, Westworld of Texas, were planning to start an open pit operation to mine gold and silver from the banks of the Desaguadero River, located near the city of Oruro. The proposed operation was to be a 50-50 joint venture and was one of the new projects underway after a long period of mistrust between the Bolivians and foreign investors. Expected output has been estimated at 32,000 troy ounces of gold and 130,000 troy ounces of silver per year. The total capital investment was estimated at about $4 million, and reserves reportedly were sufficient to allow a 10-year mining operation.

The Government of Bolivia started a project for the evaluation of alluvial gold deposits in the areas of Kaka and Mapiri in Larecaja Province and the Mapiri-Guanay-Challana areas on the Tipuani River, both in the Department of La Paz. The project contemplates technical assistance to the gold cooperatives of Tipuani and Cangalli. Preliminary geophysical studies were carried out in 1982 in the gold cooperatives' areas of Moropampa, Molleterio, Riconada, Unificada VI, and Cotoca.

Iron Ore.—Empresa Siderúrgica Boliviana S.A. (SIDERSA), the state-owned steel company, exported to Sociedad Mixta Siderúrgia Argentina 7,832 tons of iron ore grading 62.5% iron and valued at $97,000, an increase in both volume and in value in 1982 compared with the 1981 export. These iron ore shipments were part of the agreement signed by both nations in 1973. SIDERSA announced in April 1982 that the long-awaited Mutun iron ore-steel project was still waiting to solve financing problems.

Lead, Silver, and Zinc.—Production of lead declined 26% compared with that of 1981. COMIBOL continued to be the largest lead producer in the country with 58% of output. The medium-miner group produced 32%. Exports of lead declined 26% in volume and 43% in value, compared with those of 1981. Silver has been mined in Bolivia for over 500 years; however, today, there are very few native small silver mines. Silver was mainly produced as a byproduct of lead and tin mining. Silver production decreased 14% compared with that of 1981. COMIBOL accounted for 77% of total production. Exports of silver declined 26% in volume and 48% in value compared with those of 1981. Production of zinc fell 3% compared with that of 1981. COMIBOL produced slightly over one-half of the zinc output. Exports of zinc declined 0.3% in volume and 5% in value compared with those of 1981.

Cía. Minera Quioma S.A., a subsidiary of the U.S. firm American Smelting and Refining Co., was the dominant lead producer (92%) in the medium-miner group. Quioma was the second largest zinc and silver producer, and the largest was COMSUR. Among COMIBOL's zinc operations, one of the most important zinc producers was the Matilde Mine, operating at a 1,000-ton-per-day capacity, one of the richest zinc mines in the world. Earlier studies at Matilde indicated ore reserves of 3 million tons grading 18% zinc, 2% lead, and 28 grams of silver per ton. The Matilde mill has a capacity to produce 300 tons per day of zinc concentrate and 30 tons per day of lead concentrate.

COMIBOL and the state smelting corporation, ENAF, were involved in a joint venture for the construction of a new lead-silver smelter and refinery at Karachipampa, Potosí. The smelter was to have the capacity to produce 24,200 tons per year of lead and 200 tons per year of silver and was

expected to cost about $268 million. The contract for the design and construction was awarded in 1980 to a consortium of three Belgian companies and two companies from the Federal Republic of Germany. The facility was expected to become operational in 1983. However, there were problems, principally with regard to securing the 50,000 tons per year of concentrates that would be required to feed the smelter. The nearby María Luisa Chiroma deposit was inadequate, and COMIBOL was concerned that the Bolivar Mine, previously expected to be the prime supplier for the smelter, does not have sufficient reserves. As additional possibilities for sources for the new mill, COMIBOL was evaluating the lead-silver deposits in the Province of Sud Lipez. In Oruro, the Institute of Mining and Metallurgical Investigations was also examining 32 other prospects. In addition, sources of possible feed were being sought outside Bolivia, principally in Argentina and Peru.

Tin.—Bolivia maintained its position as the world's fourth largest producer of tin concentrate and metal following Malaysia, Indonesia, and Thailand. Production of tin ore and concentrate, as well as tin metal, reached 26,773 and 19,032 tons, respectively, a decrease of 10% and 5%, respectively, compared with 1981 output. Tin exports totaled 21,892 metric tons compared with 23,250 metric tons in 1981. ENAF produced 19,032 tons of metallic tin and exported 17,068 tons, primarily to the United States (12,035 tons), the Netherlands (1,950 tons), and the Federal Republic of Germany (955 tons).

Most of the underground mining was done by cut-and-fill and shrinkage-stoping methods with the exception of Catavi, the nation's largest tin operation, which was mined by block-caving methods. Having to use expensive underground hard-rock mining was the principal technical factor for the cost disadvantage of the Bolivian tin industry, compared with cheap alluvial tin dredging elsewhere in the world. Bolivian ore grades were declining in quality every year, and no new deposits had been found. The average ore grade was about 0.7% tin content. Some mines like Catavi's Siglo Veinte Mine had an even lower average mill head content.

Most of the tin concentrates were beneficiated in plants adjoining the mines. Most of these were built in the 1930's and were designed to treat ores above 1.0% tin content with plants running at an average of 50% recovery. COMIBOL's production came from 90 mines, grouped in 12 mining companies, 2 mixed cooperatives, and several leased small mines.

The second largest tin producer in the country was the medium-miner group, composed of 24 private companies, whose total production amounted to 6,026 tons, 23% of the nation's total tin output. Output of tin in this group decreased 5% in 1982 compared with 1981 output.

Smelting of tin and antimony was done by the state-owned corporation ENAF, the operating costs of which were said to be excessive compared with others elsewhere. The high-grade tin smelter was designed and built in 1970 by Klöckner Industrie Anlagen AG of the Federal Republic of Germany. It has been expanded twice, once in 1976 to 11,500 tons per year and the second time in 1978 to its current installed annual capacity of 20,830 tons of metallic tin, using feed averaging 42.1% tin.

A lower grade tin smelter, completed in 1980, was designed and built by Klöckner Humboldt Deutz AG of the Federal Republic of Germany, Machinoexport of the U.S.S.R., and P. Bergsoe and Sons of Denmark. Its design capacity was 10,000 tons of metallic tin, using feeds averaging 10% to 35% tin. Because of technical problems, full capacity has not been reached.

The La Palca tin volatilization plant, located 17 kilometers northwest of the city of Potosí and claimed to be the largest of its kind in the world, was designed and built by the U.S.S.R. in 1981. It was designed to process 400 tons of concentrates per day at about 3.5% to 6.0% tin and to yield 3,500 tons of tin powder to be used as feed at the ENAF Vinto plant. The La Palca plant was experiencing a shortage of feed.

In March 1978 and later in mid-1979, COMIBOL and the Soviet firm, Machinoexport, signed a contract for a second volatilization plant. This volatilization plant, which was also of Soviet design, would be located at Machacamarca, 20 kilometers south of Oruro. The plant would be similar to La Palca's with slight modifications; it should produce 58.8% tin at a processing rate of 400 tons per day of feed using 3% to 6% tin concentrates from the mines of Catavi, Huanuni, Colquiri, San José, and Bolivar. The construction of the Machacamarca plant has been postponed until the results of the La Palca plant were fully analyzed.

The Government of Bolivia announced on June 25, 1982, that Bolivia intends to join the International Tin Producers Association (ITPA) instead of participating in the 6th International Tin Agreement. ITPA was recently organized by the founding members Malaysia, Thailand, and Indonesia, the three largest tin producers in the world. The formal entry into ITPA became effective in October during a meeting of ministers of mines of tin producing countries, which was held in Lagos, Nigeria.

Tungsten.—Bolivia was the leading producer of tungsten in Latin America and ranked fourth with Australia as a world producer after China, the U.S.S.R., and Canada. Output decreased 9% compared with that of 1981, and exports of WO_3 concentrate increased by 6%.

The Bolivian private mining companies (medium miners) continued leading the nation's production of tungsten with 49% of the total, followed by COMIBOL with 39%, and the small miners with 12%.

The International Mining Co. operations at Chojlla, Enramada, and Chambillaya produced 84% of the total medium-miner output. The remainder was produced by San José de Berqué Ltda. According to a recent report by Churquini Enterprises Inc., a subsidiary of the Anschutz Mining Corp. of the United States, a rich tungsten deposit has been discovered at the El Chicote Grande Mine, high in the Bolivian Andes about 150 miles southeast of La Paz. A decision has been made to develop this mine. Detailed design engineering bids were evaluated by Anschutz. The deposit consists of a series of narrow wolframite veins. Reserves were estimated at 4.0 million tons grading 0.8% WO_3. The plans under evaluation were for an output of 1,000 tons per day of 0.6% to 0.65% WO_3. The mining operation and preconcentration stage would be done underground, followed by gravity concentration with jigs and tables. The concentrates would be upgraded to 65% to 70% by magnetic separation. Part of the production, high in arsenic, would be roasted to yield a salable arsenic trioxide product. The project was expected to cost $20 million to $25 million and was to begin production in early 1985.

NONMETALS

Barite and Bentonite.—Production of barite in Bolivia decreased 72% in 1982 compared with that of 1981. There were several small known bentonite and barite deposits on the Bolivian Altiplano.

The Baroid Div. of NL Industries Inc. of the United States, in a joint venture with Cía. Minera Mosamar S.A. of Bolivia, built a barite and bentonite beneficiation plant in Oruro in 1978 with an installed capacity of 10,000 tons per year of barite and 8,000 tons per year of bentonite. Reserves of bentonite were estimated as 30,000 tons of measured, 118,000 tons indicated, and 160,000 tons inferred. According to company officials, the barite meets the 4.2 specific gravity standards of the American Petroleum Institute, which the petroleum industry requires.

Cement.—Production of cement in Bolivia decreased 13% to 324,923 tons compared with 1981 output. The three cement companies operating in the country were Cía Boliviana de Cementos S.A.M. (COBOCE), located in Irpa Irpa, Department of Cochabamba, with a production capacity of 100,000 tons per year; Fábrica Nacional de Cementos S.A. (FANCESA), located at Cal Orko (Mesaverde), Department of Chuquisaca, with a production capacity of 300,000 tons per year; and Sociedad Boliviana de Cementos S.A. (SOBOCE), located at Viacha, Department of La Paz, with a capacity of 225,000 tons per year.

The total capacity of cement production for the country amounted to 625,000 tons per year. The COBOCE and FANCESA plants were basically state-owned companies through the Corporación Boliviana de Fomento, the Bolivian development corporation. The third plant, SOBOCE, was privately owned. Total cement production in 1982 reached 52% of the country's installed capacity, 8% lower than the capacity used in 1981.

FANCESA was planning an expansion by adding one preheater kiln rated at 800 tons per day.

LaFarge Consultoría et Estudos, a subsidiary of LaFarge Conseils et Estudes (LaFarge Group) for Latin America, was awarded a consulting engineering contract for the construction of the Yacuses cement plant in the Province of Chiquitos, Department of Santa Cruz. The new dry-process plant was to have an annual clinker production capacity of 345,000 tons, and the kiln was to be equipped with a cyclone preheater and would cost $105 million.

The U.S.-French consortium, GATX-Fuller S.A. and CGEE Alsthon, was awarded the contract for the design and construction of a small 60,000-ton-per-year cement

plant in El Puente, Province of Mendez, Department of Tarija, at a cost of $19 million.

The French-Canadian consortium, La-Farge-CBPI, was granted the final design contract ($1.96 million) for a new 150,000-ton-per-year cement plant (projected enlargement to 220,000 tons per year) to be located at Sevaruyo, about 100 miles south of the city of Oruro, at a cost of $40 million.

MINERAL FUELS

The Bolivian hydrocarbons sector, compared with other sectors of the nation's economy, had fewer problems and was able to partially meet its 1982 working schedule. The domestic market for refined petroleum products was fully satisfied, despite the internal and worldwide economic recession that decreased demand, mainly in the industrial and transportation sectors.

The hydrocarbon sector contributed 45.0% in value of the total exports, second after mineral exports.

Natural Gas.—The value of natural gas produced increased 17% to $382 million from $326 million in 1981.

In March 1982, Bolivia and Argentina agreed on a price increase for the first 6 months of the year. The new price agreed on for natural gas was $4.12 per thousand cubic feet, an 8% increase over that of 1981. The amount of natural gas imported by Argentina was expected to decrease gradually since more gas has been found in the north and south gasfields of Argentina.

The future of the hydrocarbons sector would depend upon future sales of natural gas. The implementation of the gas pipeline project to Brazil in the near future was the only new viable sales outlet, but it was also dependent on the needs of Brazil and the availability of financing. Production of natural gas increased 7% to 187.8 billion cubic feet compared with that of 1981. The increased output was due to the increased production at Occidental's Porvenir gas and oil field, which increased almost fivefold.

With the limited internal market and fixed export volume, 46.3% of total production was sold, and the remainder was reinjected, flared, or vented. Bolivia's domestic consumption of natural gas at present continues to be minimal at 5.9 billion cubic feet, a decrease of 4.5% compared with that of 1981.

During 1982, the Bolivian-Brazilian Joint Economic and Technical Committee, formed by the two state companies, Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) and Petrolero Brasileiro S.A., had three meetings during which the draft of the gas sales-purchases contract was discussed and most of the technical aspects of it were approved. To go ahead with the project, the requirements are approximately 2.9 trillion cubic feet in proven reserves for the Brazilian market and a little bit less than that amount for internal consumption and exports to Argentina.

The Santa Cruz-São Paulo gas pipeline cost was estimated in 1980 to be $400 million for the Bolivian section and $700 million for the Brazilian section. When completed, the gas pipeline to Brazil would generate as much as $500 million per year in foreign currency.

Petroleum.—Production of crude oil and condensates increased to 8,921,000 barrels compared with 8,091,000 barrels in 1981, thus reversing the downward trend of crude oil production started in 1974. The increase was due to larger outputs by the YPFB contractors.

Crude oil production increased in 1982 to 2,746,000 barrels from 2,726,000 barrels in 1981. A similar increase occurred in lease condensate output, with an increase from 5,365,000 barrels in 1981 to 6,175,000 barrels in 1982. The upward trend developed as a result of increased output from Occidental's Porvenir Oilfield, which became the second largest producer in the country after the YPFB Rio Grande Oilfield. Bolivia had 21 crude oil-producing fields, all belonging to YPFB. Eleven fields decreased production. None of the YPFB fields increased production. Domestic consumption of petroleum products was 9,305,000 barrels, an increase of 4.9% compared with that of 1981.

On June 29, 1982, Bolivia Andina Petroleum Corp., a subsidiary of Anschutz (Denver, Colo., United States), signed an operation contract with YPFB to explore 7 million acres for petroleum in an area known as the Subandino Norte, 80 miles north of the city of La Paz. The contract was valid for 25 years. Anschutz was to invest $2.0 million in each of the first 2 years of the contract, and at the end of the fourth year, it was to have invested at least $14.0 million. Anschutz was planning to use its deep geophysical interpretation system followed by deep drilling (more than 18,000 feet deep) for the exploration.

Occidental continued to be the sole operator in the southeastern region of Bolivia. The southern region of Bolivia continued to

have the second richest oil and gas fields. YPFB, Tesoro Bolivia Petroleum Co. and partners, and Occidental are all operating in this region.

Total crude oil reserves in Bolivia as of December 31, 1982, were estimated at 172.3 million barrels. Of this, YPFB was to have 144.7 million barrels (84%); Occidental, 11 million barrels (6%); and Tesoro, 17 million barrels (10%).

[1]Physical scientist, Division of Foreign Data.

[2]The Central Bank of Bolivia placed 1982 GDP at 17,703 million pesos at 1970 prices. The Bolivian peso was officially converted from Bolivian pesos ($b) to U.S. dollars at the rate of $b25=US$1.00 until Feb. 5, 1982, when it was devaluated to $b44=US$1.00. On March 22, the official rate was limited to state operations and to 40% of exporters' foreign exchange earnings, which were required to be turned over to the Government. By mid-June, the peso was above $b100=US$1.00 and in December, was fluctuating around $b260=US$1.00.

The Mineral Industry of Botswana

By Thomas O. Glover[1]

Botswana's economy in 1982 was generated by two sectors, mining and agriculture. Mining, the largest productive sector in the economy, contributed more than 25% of the gross domestic product (GDP). The diamond industry dominated this sector, accounting for 86% of the value of mineral production. Diamonds were the principal source of foreign exchange.

The economic progress in Botswana continued to be sluggish owing to slackened world demand for diamonds plus depressed prices for copper and nickel. These setbacks reduced GDP growth and resulted in budget and balance-of-payment deficits. The Government of Botswana implemented several austerity measures to deal with the economic downturn including devaluation of the currency, increased domestic interest rates, and a cutback in Government spending. The budget deficit was held to 2%, and Botswana's debt service ratio stood at 4%, which was considered low by developing country standards.

A new power project, costing approximately $250 million, was approved. The project will provide for the country's power needs through 1988 and will develop coal resources to substitute for imported oil in the generation of electricity. Objectives included tapping the country's large coal potential, integrating the existing power systems, and improving Botswana Power Corp.'s tariff policy. A coal-fired, mine mouth, 180-megawatt powerplant at Morupule will be constructed and was expected to be in operation in 1986. Cost of the project was estimated at $230 million.

PRODUCTION

Mineral production for Botswana remained at about the same level as that of 1981, except for increased diamond production. Output of diamonds was up approximately 57%, while mining and smelter output of nickel-copper matte decreased about 2%, and coal production increased about 9%. The contained metal in the matte averaged 38.9% nickel, 40.2% copper, and approximately 0.50% cobalt. Total production of nickel, copper, and cobalt came from the Selebi-Phikwe underground mines. Coal production came from Botswana's only coal operation, the Morupule Colliery.

Table 1.—Botswana: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
Coal, not further described	314,486	355,115	370,914	379,270	[2]414,778
Cobalt, Co content of nickel-copper matte[3]	261	294	226	254	[2]254
Copper:					
Mine output, metal content[4]	17,235	17,419	20,841	19,954	[2]21,161
Cu content of nickel-copper matte[3]	14,615	14,563	15,553	17,819	[2]18,375
Diamond:					
Gem[e] thousand carats	420	659	765	740	NA
Industrial[e] do	2,379	3,735	4,336	4,220	NA
Total do	2,799	4,394	5,101	4,960	[2]7,769
Gem stones, semiprecious, rough, not further described kilograms	10,000	5,000	20,000	--	[2]1,100
Nickel:					
Mine output, metal content[4]	21,859	22,109	23,637	21,925	[2]20,669
Ni content of nickel-copper matte[3]	16,049	16,173	15,442	18,273	[2]17,756
Nickel-copper matte, gross weight	39,517	39,823	40,099	46,565	[2]45,685
Sand and gravel cubic meters	133,553	229,856	201,925	156,921	NA
Stone, crushed, not further described do	141,415	228,526	222,033	184,355	NA
Talc	313	104	78	70	--

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through June 28, 1982.

[2]Reported figure.

[3]Figures approximate recoverable mine output and have been used as such in world production tables appearing in volume 1 of Minerals Yearbook.

[4]Analytic content of ore milled.

TRADE

Botswana's two major export commodities were diamonds and nickel-copper matte. In 1982, although diamond production increased approximately 57%, exports remained at about the 1981 level. About 50% of the diamonds produced were stockpiled owing to world market conditions. Bamangwato Concessions Ltd. (BCL) negotiated an agreement with Rio Tinto Mining of Zimbabwe (RTMZ) to process part of their nickel-copper matte at RTMZ's Zimbabwe nickel refinery. This helped reduce pressure on the AMAX Nickel Inc.'s (AMAX) Braithwaite, La., refinery which was being affected by weak nickel demand in the United States. AMAX formerly took all of the BCL matte exports. The nickel-copper matte agreement between Botswana and Zimbabwe was the first agreement between two members of the nine-nation Southern African Development Coordination Conference.

COMMODITY REVIEW

METALS

The BCL Selebi-Phikwe nickel-copper mines and smelter operation was beset with further problems in 1982, that of major supply-and-demand issues. The industrial demands for nickel and copper continued to be weak. AMAX requested major cuts in smelter matte prices and shipped tonnages. A 25% reduction in nickel-copper matte shipments to AMAX was initiated as a result of this request. The reduction of shipments to AMAX amounted to approximately 10,000 tons of matte per year. Of this amount, contracts were undertaken with Zimbabwe and Canada to take the total amount. RTMZ received 4,000 tons with Falconbridge Ltd., of Canada, receiving 6,000 tons for their refinery in Kristianland, Norway. A new process was developed at the Selebi-Phikwe smelter to pelletize the heretofore matte product. RTMZ requested the newly developed pellets, so that the pellets could be introduced directly into their already functioning smelter in Zimbabwe. Comparing 1982 and 1981 production, copper content of the matte increased 3.12% to 18,375 tons, nickel content decreased 2.83% to 17,756 tons, and cobalt content remained at 254 tons. Full production from the Phikwe Mine, through the Phikwe No. 3 shaft, commenced in 1982. Of the total production, approximately one-third was hoisted at the Selebi Mine, 14 kilometers from the Phikwe Mine, and two-thirds was hoisted at the Phikwe Mine.

NONMETALS

Botswana produced approximately 7.7 million carats of diamonds in 1982, up about 2.8 million carats from the 1981 total. The large increase in production was attributed to the opening of the new Jwaneng Mine in January. Exploration for diamonds in Botswana began in the middle 1950's. Production at the first mine, Orapa, began in 1971 and at the Letlhakane Mine in 1977. At Jwaneng, agreement to exploit the deposits and go into production was reached in December 1978, with initial production in 1982. Production was scheduled for 3 million carats in 1982, rising to 4.5 million carats by 1985. The capital cost of the Jwaneng project was put at $288 million,[2] with about 20% of the cost being subscribed to by the Government of Botswana. The three open pit diamond mines employed approximately 4,200 persons in 1982, most of whom were citizens of Botswana.

The new Jwaneng Mine is jointly owned by the De Beers Co. (51%) and the Botswana Government (49%) and was dedicated on August 14. By the end of the year, 1,379 persons were employed, including expatriates, with final employment set at 1,450. Mine life will be 22 years with all employees being Batswana within 15 years. The kimberlite deposit consists of three lobes, one large lobe in the center with one small lobe on each side. The large lobe was 1.5 kilometers long, 800 meters wide, and will be 200 meters deep when mining is completed.

A new diamond sorting center in Gaborone will be opened in 1983. The center will be processing the diamonds mined at all three Botswana mines, which should be 9 million carats by 1984. The new 11-story center had over 300 employees, with approximately 60% being diamond sorters. All 180 diamond sorters are citizens of Botswana who have received professional training in Antwerp, Belgium.

MINERAL FUELS

Botswana contains the largest deposits of coal in Africa outside the Republic of South Africa. Exploration drilling done over the past several years by Shell Coal Botswana Ltd., Charbonnage de France International Botswana, British Petroleum Botswana Ltd., and AMAX Exploration Inc., outlined the country's reserves of technically and economically recoverable bituminous coal at 3.5 billion tons.

The only coal producer in Botswana, Morupule Colliery near Palapye owned by Anglo American Coal Corp. Ltd., produced 414,778 tons of coal in 1982 valued at $4.8 million. Morupule coal was all used for domestic consumption. A new 90-megawatt, air-cooled powerplant, near Morupule, was scheduled for completion by 1986. The Morupule Colliery open pit mine will double coal production to supply the new plant.

Agreements covering the development of a thermal coal mining project at Kgaswe, near Palapye, were signed July 14, 1982, by the Government of Botswana and Shell Coal. The agreements provided for the creation of Kgaswe Coal Development Co. (Pty.) Ltd. The Government of Botswana was to receive 15% of the equity of the company at no cost, and had an option to purchase an additional 10% at a later date. The agreements did not bind Shell Coal to develop the project, but did provide for a study of the field's potential. The study will take 2 years to complete. This would be followed by an additional 2 years of construction, with the first phase of the project to be in production by 1988. This phase would be aimed at producing about 5 million tons per year, with the coal to be transported through Ellisras, the Republic of South Africa, to Richards Bay Port in the Republic of South Africa. The coal, from the Shell Coal area, will be mined using underground mining methods because the coal seam is deeper than 100 meters.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Botswana pula (P) to U.S. dollars at the rate of P0.97 = US$1.00.

The Mineral Industry of Brazil

By Travis Q. Lyday[1]

The Brazilian economy was stagnant throughout 1982, with growth in real terms estimated to be slightly above zero. Brazil's gross domestic product (GDP) in current prices expanded to an estimated $295.3 billion.[2] The accumulated rate of inflation was 99.7%, slightly up from the 95.2% recorded in 1981.

The mineral extraction sector, excluding petroleum, grew by 8.7% in 1982, although this sector continued to contribute less than 3% of the total GDP.

Although agriculture still predominates the economy, Brazil has developed an industrial base of considerable size and diversity, and the mineral sector is an important earner of foreign exchange. Iron ore continued to be the most important mineral mined and exported from Brazil with a production value estimated at $1 billion, second only to petroleum that was estimated at $3 billion. Brazil was also a major producer and exporter of columbium, beryllium, gem stones, manganese, mica, and quartz during the year, as well as an increasingly important exporter of bauxite. Brazil's predominant mineral imports were coal and copper.

In February, the Ministry of Mines and Energy (MME) announced the discovery of a new mineral province containing deposits of cassiterite, gold, monazite, topaz, and tourmaline in the upper Rio Negro River region of northern Amazonas State. The province, named Mapuera for the river of the same name, is located over a 175,000-square-kilometer area in parts of the States of Amazonas and Pará, and the Territory of Roraima.

In midyear, the MME announced the discovery of another new mineral province, located between the Jari River on the Amapá-Pará border and the Paru River in Pará State. The province, appropriately named Novo Carajás because of its proximity to Grande Carajás, includes large areas of mineralization containing chromium, copper, gold, iron ore, lead, manganese, nickel, and zinc.

Brazil continued to lessen its reliance on imported oil in 1982. Nevertheless, nearly 70% of its oil consumption requirements had to be met with foreign oil.

Government Policies and Programs.—The Brazilian Government continued to give high priority to the Grande Carajás Development Project, which in addition to mining included agricultural, forestry, and energy projects. However, at yearend it was announced that development of the iron ore mining and related construction projects was being slowed as a result of a decrease in the 1983 budget of Cia. Vale do Rio Doce (CVRD), the Brazilian state mining company charged with the development of the Carajás iron ore project. It was reported at yearend that the percentage of work completed for the Carajás iron ore mining project and related infrastructure was as follows: construction at the N4E iron ore minesite, 44%; port construction at Ponta da Madeira on the island of São Luis in Maranhão State, 29%; and the railroad connecting the minesite and port, 44%.

Itaipú, the 12,600-megawatt hydroelectric power project located on the Paraná River, approximately 8 miles upriver from the international bridge connecting Ciudad Presidente Stroessner with Foz de Iquazú between Brazil and Paraguay, continued to proceed on schedule. During the year, 12 floodgates were emplaced to seal off the flow of the Paraná River. The first 700,000-kilowatt generating turbine was to be in

operation by March 1983, with 3 to 4 additional turbines being commissioned annually until all 18 are installed. However, at yearend, it was announced that installation of the turbines at the Itaipú project was being slowed owing to an excess of electrical energy generating capacity and to weak markets in such energy-intensive industries as aluminum and copper.

Owing to the continued recession in 1982, as well as the impact of both increased domestic oil production and declining world petroleum prices, Brazil modified its national coal development and nuclear energy development programs during the year. In the initial nuclear plan, Brazil was to build 16 nuclear reactors under a nuclear energy technology exchange agreement with the Federal Republic of Germany by the end of the century. Only eight of the previously scheduled nuclear plants were to be built according to the revised plan. The revised coal plan calls for a lessened rate of production in 1985, 9.5 million tons instead of the originally planned 19.5 million tons per year.

PRODUCTION

According to preliminary estimates, the value of Brazil's 1982 mineral production increased 12% in real terms, to $7.2 billion from the 1981 figure of $6.5 billion. Metals accounted for $1.9 billion; nonmetals, $1.5 billion; and mineral fuels, $3.8 billion. The latest available official data reported by the Departamento Nacional da Produção Mineral (DNPM) (the National Department of Mineral Production)[3] shows that the value of mineral output grew by 4% in real terms in 1981 compared with the substantial 41% increase achieved in 1980.

During 1981, the latest year for which official data are available, 91% of the value of all metallic mineral production was accounted for by five commodities: iron ore, 51.7%; gold, 17.0%; bauxite, 8.3%; tin, 7.1%; and manganese, 6.9%. Almost 76% of the value of all nonmetallic mineral production was comprised of granite, 24.8%; limestone, 23.0%; clay, 11.5%; phosphate rock, 9.6%; and sand, 7.0%. Crude petroleum represented 82.6% of the total fossil fuel value, followed by natural gas, 10.2% and coal, 7.2%.

Fossil fuels contributed 51.1% of the total value of mineral output in 1981, followed by nonmetallic minerals, 24.4%; metallic minerals, 23.4%; and diamond and gems, 1.1%.

Table 1.—Brazil: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite, dry basis, gross weight	1,160,112	2,387,741	5,537,676	5,770,448	4,500,000
Alumina	352,100	449,100	492,700	519,000	500,000
Metal:					
Primary	186,365	r238,310	260,611	256,418	3299,054
Secondary	31,817	r43,687	53,180	36,688	347,149
Antimony, mine output, metal content	r274	r73	46	269	270
Beryllium: Beryl concentrate, gross weight	739	r452	550	811	800
Cadmium, metal, primary	28	21	40	28	373
Chromium:					
Crude ore	957,798	891,543	833,935	926,413	950,000
Concentrate	203,107	229,836	187,396	152,859	170,000
Marketable product[4]	269,870	340,385	313,067	236,390	250,000
Columbium-tantalum ores and concentrates, gross weight:					
Columbite and tantalite	203	374	538	299	275
Djalmaite concentrate	19	10	18	13	13
Pyrochlore concentrate	17,900	28,909	30,700	29,886	28,350
Copper:					
Mine output, metal content	59	5,262	1,403	13,945	13,000
Metal, secondary	45,000	r53,110	63,000	45,000	357,000
Gold:					
Mine output, troy ounces	128,860	107,158	131,500	150,000	3260,421
Garimpeiros (prospectors)[5], do	172,038	212,100	1,168,500	1,050,000	31,186,361
Total, do	300,898	319,258	1,300,000	1,200,000	31,446,782

See footnotes at end of table.

Table 1.—Brazil: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Iron and steel:					
Ore and concentrate (marketable product):[4]					
Gross weight ---- thousand tons	84,985	[r]104,083	114,732	97,860	110,000
Iron content ---- do	55,240	67,654	74,576	63,609	71,500
Metal:					
Pig iron[6] ---- do	10,331	[r]12,038	12,960	11,022	11,054
Ferroalloys, electric-furnace:					
Chromium metal	--	--	--	6	[3]6
Ferroboron	11	26	27	--	--
Ferrocalcium silicon	5,790	6,639	8,025	7,481	[3]9,657
Ferrochromium	62,170	84,514	93,443	118,780	[3]96,646
Ferrocolumbium	10,251	13,913	17,530	14,632	[3]11,506
Ferromanganese	117,843	133,563	140,496	107,872	[3]120,743
Ferromolybdenum	1,690	1,469	802	797	[3]337
Ferronickel	10,976	11,355	11,280	10,744	[3]12,883
Ferrophosphorus	--	148	354	346	[3]22
Ferrosilicochromium	4,698	7,239	8,086	8,655	[3]2,598
Ferrosilicomagnesium	9,968	14,432	13,734	11,002	[3]11,275
Ferrosilicon	72,842	75,712	109,140	126,779	[3]121,392
Ferrosilicozirconium	--	--	488	497	[3]503
Ferrotitanium	436	795	698	498	[3]430
Ferrotungsten	336	396	217	95	[3]74
Ferrovanadium	456	851	807	296	[3]238
Inoculant	--	--	--	1,428	[3]1,393
Silicomanganese	106,249	127,503	134,243	142,743	[3]172,358
Silicon metal	5,831	5,654	12,379	18,957	[3]17,921
Total	409,547	484,209	551,749	571,608	[3]579,982
Steel, crude, excluding castings thousand tons	12,107	13,893	15,339	13,230	[3]12,999
Semimanufactures, flat and nonflat -- do	[r]10,406	[r]11,918	13,307	11,346	[3]11,642
Lead:					
Mine output, metal content	31,203	27,927	27,849	28,440	18,000
Metal:					
Primary	47,236	55,084	44,519	34,657	[3]21,943
Secondary	33,220	[r]42,968	40,431	31,100	[3]26,299
Manganese ore and concentrate (marketable),[4] gross weight	[r]1,917,100	2,259,331	2,281,450	2,042,144	1,300,000
Nickel:					
Mine output, metal content	3,600	2,964	5,838	6,567	5,600
Ferronickel, Ni content	2,228	2,463	2,504	2,340	[3]4,808
Rare-earth metals: Monazite concentrate, gross weight	[r]2,541	[r]1,900	2,532	2,200	2,000
Silver[7] ---- thousand troy ounces	506	1,065	737	765	750
Tin:					
Mine output, metal content	6,341	[r]7,005	6,930	8,297	9,000
Metal, smelter, primary	[r]9,329	10,133	8,792	7,639	[3]9,298
Titanium concentrates, gross weight:					
Ilmenite	20,077	[r]13,191	16,839	15,087	15,000
Rutile	365	439	428	127	200
Tungsten, mine output, metal content	[r]924	[r]933	876	1,248	1,100
Zinc:					
Concentrate and salable ore	209,719	344,389	641,558	400,631	420,000
Mine output, metal content	58,721	[r]97,900	105,000	96,582	101,000
Metal, smelter:					
Primary	56,097	63,494	78,303	91,944	[3]95,528
Secondary	12,200	[r]15,327	17,666	19,000	14,400
Zirconium: Zircon concentrate, gross weight[8]	4,301	[r]2,623	3,410	4,000	3,500
NONMETALS					
Asbestos:					
Crude ore	2,080,371	2,422,420	2,602,501	2,400,000	2,400,000
Fiber	122,815	138,457	169,173	138,420	138,000
Barite:					
Crude	[r]54,033	489,997	108,015	178,895	150,000
Beneficiated	87,145	73,014	62,085	98,804	80,000
Marketable product[4]	107,492	108,042	104,752	116,340	120,000
Calcite	18,467	16,922	41,842	30,912	35,000
Cement, hydraulic ---- thousand tons	23,187	24,874	22,066	26,051	25,434
Clays:					
Bentonite	167,614	212,503	247,954	166,338	200,000
Kaolin:					
Crude	1,595,482	1,343,005	1,156,447	1,063,480	1,050,000
Beneficiated	[r]294,457	349,446	410,197	469,757	460,000
Marketable product[4]	[r]415,060	943,589	477,858	556,753	550,000

See footnotes at end of table.

Table 1.—Brazil: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Clays —Continued					
Other:					
Crude thousand tons	4,457	3,900	5,582	21,601	22,000
Beneficiated do	1,029	1,620	1,656	2,229	2,000
Diamond:					
Gem[e] thousand carats	236	236	253	163	175
Industrial[e] do	384	384	414	926	975
Total[e 9] do	620	620	667	1,089	1,150
Diatomite:					
Crude	32,940	136,669	12,963	13,900	13,000
Beneficiated	10,709	6,650	10,807	13,295	10,000
Marketable product[4]	12,030	16,547	14,828	17,000	16,000
Feldspar and related materials:					
Feldspar, marketable product[4]	r102,375	r144,550	157,373	96,400	95,000
Leucite, marketable product[4]	8,075	511	6,796	6,500	6,500
Sodalite, crude, marketable product	687	2,610	562,124	500,000	500,000
Total	r111,137	r147,671	726,293	602,900	601,500
Fluorspar:					
Crude	126,232	163,179	86,347	53,000	55,000
Marketable products:					
Direct-shipping crude ore (sales)	465	106	100	90	100
Concentrates:					
Acid-grade	31,174	26,852	32,729	36,226	35,000
Metallurgical-grade	30,161	25,547	22,640	17,403	17,000
Total marketable products	61,800	52,505	55,469	53,719	52,100
Graphite:					
Crude	47,845	135,977	234,883	200,000	175,000
Marketable products:					
Direct-shipping crude ore	859	85,130	6,000	16,318	NA
Concentrate	10,357	r10,867	21,294	17,499	15,000
Total	11,216	r95,997	27,294	33,817	NA
Gypsum and anhydrite, crude	474,732	464,730	605,824	695,290	700,000
Kyanite:					
Crude	6,908	8,193	18,296	18,150	18,000
Beneficiated	1,356	1,299	4,056	4,000	4,000
Marketable products[4]	1,773	1,750	1,750	1,814	1,800
Lime, hydrated, and quicklime[e] thousand tons	4,630	4,720	4,810	5,000	5,000
Lithium mineral concentrates:					
Amblygonite	431	187	182	277	200
Lepidolite	50	58	51	2	50
Petalite	1,996	1,501	2,487	2,080	2,500
Spodumene	885	--	98	243	200
Total	3,362	1,746	2,818	2,602	2,950
Magnesite:					
Crude[10]	409,936	591,107	728,713	613,947	640,000
Beneficiated	217,270	265,067	315,851	284,906	300,000
Mica, all grades[11]	4,551	r4,074	4,817	4,500	4,500
Nitrogen: N content of ammonia	202,900	265,500	351,600	375,700	503,200
Phosphate rock including apatite:					
Crude:					
Mine product thousand tons	5,967	12,478	16,533	18,000	18,000
Of which, sold directly do	27	39	50	40	40
Concentrate:					
Gross weight do	r1,096	r1,628	2,612	2,764	2,732
P_2O_5 content do	r377	r603	989	979	968
Pigments, mineral: Other, crude	6,199	7,532	6,465	7,600	7,000
Precious and semiprecious stones except diamond, crude and worked:[11]					
Agate kilograms	r1,770,868	r1,589,096	1,738,890	1,424,381	NA
Amethyst do	r357,309	r327,479	310,594	234,198	NA
Aquamarine do	r2,475	r1,499	6,739	3,807	NA
Cat's-eye do	68	3	--	30	NA
Citrine do	r49,656	r60,658	62,971	52,094	NA
Emerald do	r16,717	r7,468	9,126	10,538	NA
Garnet do	r2,900	r837	54	2	NA

See footnotes at end of table.

Table 1.—Brazil: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Precious and semiprecious stones except diamond, crude and worked[11] —Continued					
Opal ____ kilograms	[r]617	[r]1,382	2,169	103	NA
Ruby ____ value	$505	[r]$2,275	--	--	NA
Sapphire ____ kilograms	1	([12])	--	--	NA
Topaz ____ do	[r]4,196	[r]15,729	7,189	4,011	NA
Tourmaline ____ do	[r]2,506	[r]2,126	3,938	4,319	NA
Turquoise ____ value	--	$337	NA	NA	NA
Other ____ kilograms	[r]482,684	[r]406,213	292,677	249,660	NA
Quartz crystal, all grades[11]	2,406	4,743	5,753	5,154	NA
Salt:					
Marine ____ thousand tons	2,727	2,866	3,042	2,766	2,700
Rock ____ do	572	689	796	838	825
Silica (silex)	5,721	7,005	10,245	4,517	4,500
Sodium compounds:					
Caustic soda	289,233	645,143	691,000	759,000	760,000
Soda ash, manufactured (barilla)	120,651	118,659	176,000	188,000	190,000
Stone, sand and gravel:					
Dimension stone:					
Marble, rough-cut[13]	160,229	177,290	NA	NA	NA
Slate	186,995	34,957	7,679	19,464	NA
Crushed and broken stone:					
Basalt[14]	324,264	198,789	NA	NA	NA
Calcareous shells	[r]285,656	1,002,692	1,244,464	1,212,252	NA
Dolomite ____ thousand tons	1,092	1,712	1,354	1,961	NA
Gneiss[15] ____ do	2,012	[r]1,244	NA	NA	NA
Granite ____ thousand cubic meters	37,842	42,684	47,032	49,225	NA
Limestone ____ thousand tons	46,283	44,664	50,170	52,066	50,000
Quartz[16]	95,720	57,920	133,068	144,707	NA
Quartzite:					
Crude	212,066	379,253	245,592	795,104	NA
Processed	109,497	50,358	139,282	122,700	NA
Shale	540,381	587,428	NA	NA	NA
Sand ____ thousand cubic meters	12,397	17,959	22,014	35,876	NA
Sulfur, elemental, byproduct	56,503	92,061	130,641	102,297	100,000
Talc and related materials:					
Talc, marketable product[4]	190,674	310,397	338,450	328,000	NA
Pyrophyllite, marketable product[4]	69,846	55,081	74,606	56,000	NA
Other: Agalmatolite, marketable product	68,624	101,281	131,034	49,147	NA
Vermiculite:					
Crude	19,611	10,496	35,466	77,997	NA
Marketable product[4]	4,031	7,382	12,181	14,307	15,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous (marketable)[4] ____ thousand tons	5,050	7,604	8,300	5,300	6,200
Coke, metallurgical, all types ____ do	3,417	3,930	4,049	5,700	NA
Gas, natural:					
Gross ____ million cubic feet	68,271	67,045	77,868	88,286	[3]106,968
Marketed ____ do	40,074	[e]43,000	50,000	NA	--
Natural gas liquids ____ thousand 42-gallon barrels	2,088	2,012	2,063	2,426	2,950
Petroleum and refinery products:					
Crude ____ do	60,615	62,444	68,496	77,895	[3]94,738
Refinery products:					
Gasoline ____ do	89,944	84,780	68,301	71,100	NA
Jet fuel ____ do	25,484	20,046	20,278	23,360	NA
Kerosine ____ do			4,095		
Distillate fuel oil ____ do	106,927	111,091	121,846	216,502	NA
Residual fuel oil ____ do	111,959	113,179	105,392		
Lubricants ____ do	3,664	3,285	4,233	3,755	NA

See footnotes at end of table.

Table 1.—Brazil: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Other thousand 42-gallon barrels	62,354	85,253	69,692	NA	NA
Refinery fuel and losses do			11,252	NA	NA
Total do	400,332	417,634	405,089	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Oct. 7, 1983.

[2]In addition to the commodities listed, molybdenite, bismuth, and uranium oxide are produced, but output is not reported and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Figures represent sum of (1) crude material sold directly and (2) production of concentrate. Sale of crude material in any given year may exceed production in that year as a result of the sale of stocks of crude material mined but not sold or beneficiated in previous years. Similarly, output of concentrates in any given year may exceed the amount of crude material mined in that year owing to treatment of previously mined but not yet processed ores.

[5]All figures except those for 1978 differ substantially from those appearing in the latest available official Brazilian sources owing to inclusion of estimates for unreported production by individual prospectors (garimpeiros). Officially reported figures are as follows, in troy ounces: Major mines: 1978—128,860; 1979—107,158; 1980—131,432 (revised); 1981—140,691; 1982—not available; Garimpeiros: 1978—172,038; 1979—36,234; 1980—310,704 (revised); 1981—414,744; 1982—not available.

[6]Includes sponge iron as follows, in thousand metric tons: 1978—270; 1979—324; 1980—275; 1981—226; 1982—226 (estimated).

[7]Smelter and/or refined metal.

[8]Includes baddeleyite-caldasite.

[9]Figures represent officially reported output plus official Brazilian estimates of output by nonreporting miners; officially reported output was as follows, in thousands of carats: 1978—86; 1979—83; 1980—158; 1981—136; 1982—not available.

[10]Includes the following quantities sold directly without beneficiation, in metric tons: 1978—6,051; 1979—5,177; 1980—1,059; 1981—93; 1982—not available.

[11]Exports.

[12]Less than 1/2 unit.

[13]Data on output in gravimetric units are not available for 1980 and later years, but output on a volumetric basis was reported as follows, in cubic meters: 1980—67,844; 1981—66,893; 1982—not available.

[14]Data on output in gravimetric units are not available for 1980 and later years, but output on a volumetric basis was reported as follows, in cubic meters: 1980—483,617; 1981—438,391; 1982—not available.

[15]Data on output in gravimetric units are not available for 1980 and later years, but output on a volumetric basis was reported as follows, in cubic meters: 1980—47,031,817; 1981—49,225,056; 1982—not available.

[16]Apparently includes crude quartz used to produce quartz crystal (listed separately in this table) as well as additional quantities of common quartz.

TRADE

As a result of adverse international market conditions throughout 1982, Brazil was unable to achieve the projected $3 billion trade surplus forecasted, although the country was able to maintain a positive trade balance, estimated to be $800 million, for the second consecutive year.

Total imports of $19.4 million were down 12.2% from those of 1981, while exports fell 13.3% to $20.2 billion. The oil import bill declined $1 billion, from the revised $10.6 billion, to $9.6 billion. According to preliminary estimates, mineral trade, excluding petroleum, declined 0.4% from 1981 although still registering a $1.36 billion surplus. Metallic minerals, dominated by iron ore, accounted for virtually all of the minerals exported from Brazil.

Table 2.—Brazil: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	18	70	70	
Aluminum:				
Ore and concentrate thousand tons	2,679	4,126	1,585	Canada 1,723; U.S.S.R. 392; Trinidad and Tobago 228.
Oxides and hydroxides	88	637	--	Argentina 562; Uruguay 62; Chile 10.
Metal including alloys:				
Unwrought	--	2,159	53	Japan 1,701; Uruguay 335; West Germany 50.
Semimanufactures	8,033	9,675	1,424	Chile 3,269; Argentina 1,705; Costa Rica 800.
Antimony: Metal including alloys, all forms	4	--		
Beryllium:				
Ore and concentrate	500	--		
Metal including alloys, all forms	NA	43	--	Mainly to United States.
Chromium: Oxides and hydroxides	190	128	--	United Kingdom 124; Uruguay 3.
Cobalt: Metal including alloys, all forms	4	--		
Columbium and tantalum:				
Ore and concentrate	456	--		
Metal including alloys, all forms, tantalum kilograms	4	--		
Copper:				
Ore and concentrate	--	45,925	--	All to Japan.
Matte and speiss including cement copper	1,210	800	--	All to Belgium-Luxembourg.
Metal including alloys:				
Unwrought	--	1	--	All to Paraguay.
Semimanufactures	--	11,282	7,620	Ireland 505; Iraq 454; Uruguay 356.
All forms	3,079	--		
Gold: Metal including alloys, unwrought and partly wrought troy ounces	1	--		
Iron and steel:				
Iron ore and concentrate:				
Including roasted pyrite thousand tons	78,958	--		
Excluding roasted pyrite do	--	85,798	1,948	Japan 28,603; West Germany 16,843; Italy 6,172.
Metal:				
Scrap	7	7	--	All to West Germany.
Pig iron, cast iron, related materials	842,016	715,084	231,889	West Germany 77,700; Italy 74,300; Argentina 34,462.
Ferroalloys:				
Ferrochromium	45,921	NA		
Ferromanganese	37,833	36,490	21,250	Venezuela 10,527; Japan 2,000; Colombia 1,245.
Ferrosilicon	29,664	NA		
Unspecified	56,384	223,578	108,086	Japan 70,640; Netherlands 23,431; Canada 6,772.
Steel, primary forms	284,804	136,536	9,914	Argentina 26,173; Mozambique 13,244; Jordan 12,502.
Semimanufactures:				
Bars, rods, angles, shapes, sections	214,503	636,593	134,689	Iraq 140,878; Nigeria 77,400; Syria 32,730.
Universals, plates, sheets	743,982	768,557	280,919	Belgium-Luxembourg 124,320; Canada 45,894; Argentina 45,455.
Hoop and strip	26,541	9,124	12	West Germany 2,122; Argentina 1,957; Uruguay 1,320.
Rails and accessories	2,903	12,745	13	Bolivia 8,673; Iraq 3,939; Switzerland 37.
Wire	15,521	21,481	1,856	Nigeria 6,450; Paraguay 2,574; Colombia 2,520.
Tubes, pipes, fittings	258,204	283,024	184,546	Canada 14,129; Colombia 11,726; China 10,809.
Castings and forgings, rough	1,091	1,224	526	Belgium-Luxembourg 306; Paraguay 127; Argentina 66.
Lead: Metal including alloys:				
Unwrought	--	419	--	Republic of South Africa 404; Dominican Republic 10; Uruguay 3.
Semimanufactures	--	20	--	Mozambique 15; Paraguay 4.
All forms	2,235	--		
Manganese:				
Ore and concentrate thousand tons	1,037	1,018	59	Japan 142; Romania 136; United Kingdom 127.
Oxides	2,246	1,983	64	Argentina 1,140; Colombia 740; Venezuela 28.

See footnotes at end of table.

Table 2.—Brazil: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Metalloids:				
Silicon	6,921	--		
Unspecified	6	13,506	501	Japan 9,275; U.S.S.R. 2,250; Netherlands 1,200.
Molybdenum: Metal including alloys, all forms, value, thousands	(1)	$24	--	Mexico $22; Chile $2.
Nickel: Metal including alloys:				
Semimanufactures	--	6	--	West Germany 3; Colombia 1; Peru 1.
All forms	8	--		
Platinum-group metals: Metal including alloys, unwrought and partly wrought:				
Palladium, troy ounces	100	--		
Unspecified, value, thousands	--	$499	$283	Netherlands $135; Argentina $75; Chile $5.
Silver: Metal including alloys, unwrought and partly wrought, value, thousands	$2,904	$15	--	Bolivia $3; Argentina $1; Chile $1.
Tin: Metal including alloys:				
Unwrought	--	4,747	1,135	Netherlands 1,992; East Germany 345; United Kingdom 332.
Semimanufactures	--	187	10	West Germany 175; Panama 1; Paraguay 1.
All forms	3,812	--		
Titanium:				
Ore and concentrate, kilograms	200	--		
Oxides, value	(2)	$2	--	Uruguay $1.
Metal including alloys, all forms, kilograms	81	--		
Tungsten:				
Ore and concentrate	782	1,741	504	Netherlands 462; West Germany 350; Sweden 337.
Metal including alloys, all forms	(3)	2	--	Mexico 1.
Uranium and/or thorium: Ore and concentrate, value	--	$13,228	--	All to France.
Vanadium: Ore and concentrate	--	4293	244	West Germany 33; Netherlands 13; Sweden 1.
Zinc:				
Oxides	74	18	--	Chile 15; Bolivia 3.
Blue powder	--	53	--	All to Argentina.
Metal including alloys:				
Unwrought	--	2,500	2,500	
Semimanufactures	--	7	--	Paraguay 6.
All forms	230	--		
Other:				
Ores and concentrates	--	811	811	
Oxides and hydroxides	12	--		
Ashes and residues	451	704	124	France 282; Japan 217; Sweden 68.
Pyrophoric alloys	451	--		
Base metals including alloys, all forms	--	28	10	Bolivia 11; Uruguay 7.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1	1	--	All to Bolivia.
Artificial: Corundum	19,190	15,711	3,156	Mexico 4,240; Argentina 1,996; Japan 1,973.
Dust and powder of precious and semiprecious stones:				
Including diamond, carats	7,700	--		
Excluding diamond, value, thousands	--	$12	$12	
Grinding and polishing wheels and stones	1,479	1,181	111	Argentina 178; Chile 167; Philippines 129.
Asbestos, crude	30	464	--	Mexico 122; Venezuela 120; India 111.
Barite and witherite	18,125	24,255	--	Venezuela 17,950; Trinidad and Tobago 6,300; Argentina 5.
Boron materials: Oxides and acids	1	(5)	--	All to Bolivia.
Cement	220,832	168,376	--	Paraguay 144,756; Bolivia 19,409; Argentina 3,762.
Clays and clay products:				
Crude:				
Bentonite	149	--		
Kaolin	183,025	--		

See footnotes at end of table.

Table 2.—Brazil: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products —Continued				
Crude —Continued				
Unspecified	3,239	135,521	--	Belgium-Luxembourg 85,006; Italy 35,220; Japan 9,425.
Products:				
Nonrefractory	r128,566	118,022	6,988	Paraguay 35,715; Argentina 22,815; Chile 9,444.
Refractory including nonclay brick	18,087	25,665	--	Argentina 7,795; Romania 4,966; Mexico 1,689.
Diamond:				
Gem, not set or strung value, thousands	(6)	$6,100	$1,931	Switzerland $1,564; Japan $993; Belgium-Luxembourg $722.
Industrial do	(7)	$127	$13	Italy $101; Japan $13.
Feldspar, fluorspar, related materials:				
Feldspar	4,051	--	--	
Unspecified	--	3,001	--	Italy 3,000.
Fertilizer materials:				
Crude, n.e.s	--	5	--	Colombia 4.
Manufactured:				
Ammonia	130	15,137	--	Belgium-Luxembourg 15,000; Uruguay 99; Paraguay 35.
Nitrogenous	444	592	--	Bolivia 470; Paraguay 119; Peru 2.
Phosphatic	3,435	3,013	--	Argentina 2,500; Paraguay 512.
Potassic	653	569	--	Uruguay 300; Paraguay 269.
Unspecified and mixed	5,285	10,021	--	Paraguay 5,659; Uruguay 2,653; Argentina 1,335.
Graphite and natural	7,741	7,439	5,841	Japan 1,032; United Kingdom 227; France 138.
Gypsum and plaster	3,544	3,118	--	Paraguay 3,098; Uruguay 20.
Halogens: Chlorine	--	171	--	Mozambique 121; Paraguay 50.
Lime	7,757	5,148	--	Paraguay 4,570; Argentina 500; Bolivia 76.
Magnesium compounds: Magnesite	88,847	106,196	15,500	Poland 72,055; Peru 6,003; Venezuela 5,000.
Mica:				
Crude including splittings and waste	4,818	1,950	339	West Germany 1,225; Venezuela 375; Switzerland 6.
Worked including agglomerated splittings	(3)	1		
Phosphates, crude	--	22	--	All to Uruguay.
Pigments, mineral: Iron oxides and hydroxides, processed	797	2,123	618	Paraguay 754; Argentina 382; Chile 303.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$10,328	$59,490	$29,341	Japan $10,467; West Germany $6,870; Switzerland $5,629.
Gem material thousand carats	27,685	--	--	
Synthetic value, thousands	(8)	$16	--	Japan $15; West Germany $1.
Salt and brine	178,777	141,861	75,600	Uruguay 38,590; Guatemala 11,949; Paraguay 8,022.
Sodium and potassium compounds, n.e.s	24,126	--		
Potassium hydroxide including sodic and potassic peroxides value, thousands	--	$1	--	All to Bolivia.
Sodium hydroxide	--	146,244	47,200	Argentina 25,935; Canada 17,500; Guinea 10,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	123,526	92,025	255	Italy 59,899; Japan 11,689; Spain 3,911.
Worked	10,057	9,371	1,969	Japan 2,033; Paraguay 1,432; Mexico 1,031.
Dolomite, chiefly refractory-grade	5	100	--	All to Argentina.
Gravel and crushed rock	104	142	--	Bolivia 137; Paraguay 5.
Limestone other than dimension	1,066	505	--	Paraguay 465; Uruguay 40.
Quartz and quartzite	5,845	5,317	458	West Germany 2,602; Belgium-Luxembourg 965; Japan 464.
Sand other than metal-bearing	4,109	4,631	--	Argentina 3,109; Peru 1,440; Bolivia 41.

See footnotes at end of table.

Table 2.—Brazil: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental, crude including native and byproduct	--	11	--	Uruguay 10.
Sulfuric acid	175	363	--	Bolivia 240; Paraguay 105; Colombia 12.
Talc, steatite, soapstone, pyrophyllite	496	499	19	Paraguay 224; Peru 95; West Germany 56.
Vermiculite	1,176	--		
Other:				
Crude	2,175	4,313	2,003	Netherlands 2,208; Italy 36; Australia 18.
Slag and dross, not metal-bearing	446	325	--	All to Paraguay.
Oxides and hydroxides of barium, magnesium, strontium	--	21	--	Argentina 20; Peru 1.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	139	24,187	--	Paraguay 21,789; Bolivia 1,687; Uruguay 375.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	7	2,001	--	Tanzania 1,999; Argentina 2.
Carbon: Carbon black	729	1,579	--	Chile 775; Peru 510; Uruguay 216.
Coal:				
Anthracite and bituminous	--	185	--	Argentina 135; Paraguay 50.
Briquets of anthracite and bituminous coal	--	25	--	All to Argentina.
All grades including briquets	505	--		
Coke and semicoke	68	37	--	All to Paraguay.
Hydrogen, helium, rare gases	278	87	--	Argentina 84; Bolivia 1; Chile 1.
Petroleum and refinery products:				
Crude, thousand 42-gallon barrels	430	4,771	3,238	Zaire 1,165; Netherlands Antilles 368.
Refinery products:				
Liquefied petroleum gas, do.	426	496	--	Paraguay 206; Uruguay 185; Suriname 105.
Gasoline, do.	1,911	8,924	--	Nigeria 6,466; Argentina 1,264; Uruguay 486.
Mineral jelly and wax, do.	34	200	97	Mexico 40; Guatemala 16; Venezuela 15.
Kerosine and jet fuel, do.	1,321	4,172	--	Nigeria 2,570; Argentina 499; Congo 419.
Distillate fuel oil, do.	2,935	3,089	--	Congo 1,013; Nigeria 809; Paraguay 190.
Lubricants, do.	95	374	75	Mexico 184; Netherlands 94; Paraguay 6.
Nonlubricating oils, do.	692	3	--	Uruguay 2.
Residual fuel oil, do.	2,597	7,908	4,985	Netherlands 2,184; Italy 408; Bahamas 331.
Asphalt, do.	53	62	--	Paraguay 45; Bolivia 13; Zaire 3.
Bituminous mixtures, do.	2	8	--	Bolivia 4; Paraguay 2; Argentina 1.
Unspecified, do.	10	--		
Tars and other crude chemicals derived from coal, gas, and petroleum	2,222	13,228	--	Netherlands 7,785; Bahamas 5,226; Argentina 159.

rRevised. NA Not available.
[1]Quantity reported at only 148 kilograms.
[2]Quantity reported at only 3 kilograms.
[3]Less than 1/2 unit.
[4]May contain molybdenum ore.
[5]Unspecified quantity valued at $1,000.
[6]Quantity reported at only 2,825 carats.
[7]Quantity reported at only 2,575 carats.
[8]Quantity reported at only 482,475 carats.

Table 3.—Brazil: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	90	78	17	West Germany 25; France 16; Netherlands 10.
Aluminum:				
Ore and concentrate	13,175	14,971	1	Guyana 14,949; United Kingdom 21.
Oxides and hydroxides	64,108	26,867	542	Jamaica 24,506; West Germany 1,161; Canada 453.
Metal including alloys:				
Scrap	11,745	5,340	5,251	Canada 72; Egypt 16; Japan 1.
Unwrought	46,702	28,241	5,754	Canada 8,972; Italy 3,465; Netherlands 2,540.
Semimanufactures	18,628	7,605	3,465	United Kingdom 1,468; West Germany 1,163; Netherlands 406.
Beryllium: Metal including alloys, all forms value, thousands	$9	$2	--	Mainly from West Germany.
Chromium:				
Ore and concentrate	31,437	21,966	4,057	Philippines 8,300; Republic of South Africa 5,591; Mozambique 4,018.
Oxides and hydroxides	238	142	(1)	West Germany 67; Poland 65; China 10.
Cobalt: Oxides and hydroxides	51	16	9	United Kingdom 3; West Germany 2; Netherlands 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	--	$80	$72	Netherlands $7; Switzerland $1.
Copper: Metal including alloys:				
Scrap	3,435	1,483	1,040	Canada 214; Chile 208; Paraguay 19.
Unwrought	208,232	152,945	873	Chile 106,091; Peru 15,645; Zaire 12,063.
Semimanufactures	1,961	2,185	577	West Germany 868; Japan 265; Netherlands 253.
Iron and steel:				
Iron ore and concentrate	37	--		
Excluding roasted pyrite	--	30	24	Switzerland 5; West Germany 1.
Metal:				
Scrap	21,909	6,828	6,704	Paraguay 96; West Germany 28.
Pig iron, cast iron, related materials	12,131	81,309	1,294	Trinidad and Tobago 79,316; Canada 170; West Germany 162.
Ferroalloys, unspecified	2,503	6,165	51	Dominican Republic 4,402; Netherlands 650; Republic of South Africa 502.
Steel, primary forms	61,418	391,368	3,981	Netherlands 99,967; Belgium-Luxembourg 78,197; Spain 64,942.
Semimanufactures:				
Bars, rods, angles, shapes, sections	53,727	61,198	2,299	Spain 30,004; West Germany 11,993; Japan 4,748.
Universals, plates, sheets	425,973	312,991	23,053	France 86,700; West Germany 59,638; Japan 52,172.
Hoop and strip	9,886	7,339	1,225	West Germany 2,108; United Kingdom 1,065; Japan 781.
Rails and accessories	32,659	29,633	1,360	Japan 26,220; Austria 1,000; Italy 447.
Wire	4,376	2,671	195	Italy 799; Japan 706; Belgium-Luxembourg 299.
Tubes, pipes, fittings	76,128	93,902	3,061	Japan 42,197; Italy 19,079; Romania 9,350.
Castings and forgings, rough	430	230	46	West Germany 114; United Kingdom 32; Spain 23.
Lead:				
Ore and concentrate	34,801	15,405	6,655	Republic of South Africa 8,750.
Oxides	369	192	14	Mexico 127; Argentina 50; West Germany 1.
Metal including alloys:				
Scrap	--	1,770	1,770	
Unwrought	--	212	--	Peru 151; Belgium-Luxembourg 61.
Semimanufactures	--	1	(1)	
All forms	1,472	--		
Magnesium: Metal including alloys:				
Scrap	--	243	--	Republic of South Africa 170; Belgium-Luxembourg 37; Netherlands 36.
Unwrought	--	5,008	3,742	Norway 1,266.
Semimanufactures	--	9	8	Switzerland 1.
All forms	13,093	--		

See footnotes at end of table.

Table 3.—Brazil: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate	28,501	15,293	2,893	Mexico 11,068; Belgium-Luxembourg 1,332.
Oxides	27	4	(1)	Japan 2; Belgium-Luxembourg 1.
Metal including alloys, all forms	NA	--		
Mercury 76-pound flasks	5,831	2,698	87	Mexico 2,582; Netherlands 29.
Metalloids: Unspecified	7,415	6,921	6,635	United Kingdom 92; West Germany 87; Canada 85.
Molybdenum: Metal including alloys, all forms	115	44	23	West Germany 12; Netherlands 7; Austria 1.
Nickel:				
Matte and speiss	2,735	33	18	Republic of South Africa 10; Austria 4.
Metal including alloys:				
Scrap	6	10	10	
Unwrought	5,747	4,922	1,342	Canada 1,684; Norway 600; Netherlands 426.
Semimanufactures	634	468	104	West Germany 122; Netherlands 75; United Kingdom 64.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified value, thousands	$8,309	$4,769	$984	West Germany $2,333; Netherlands $673; Japan $315.
Silver:				
Ore and concentrate do	--	$2	$2	
Waste and sweepings do	$18	--		
Metal including alloys, unwrought and partly wrought do	$67,105	$23,748	$1,130	Mexico $10,220; Peru $6,641; West Germany $3,303.
Tin:				
Ore and concentrate	3,605	301	--	All from Bolivia.
Metal including alloys:				
Unwrought value, thousands	--	$2	$1	West Germany $1.
Semimanufactures	--	11	2	Netherlands 5; West Germany 4.
All forms	35	--		
Titanium: Oxides	4,276	5,763	210	Belgium-Luxembourg 4,210; West Germany 544; France 380.
Tungsten:				
Ore and concentrate	2,216	2,241	61	Chile 2,109; Netherlands 45; Canada 25.
Metal including alloys, all forms	44	39	17	Austria 7; West Germany 7; Netherlands 5.
Uranium and/or thorium: Ore and concentrate value, thousands	--	$35	--	All from Australia.
Vanadium:				
Ore and concentrate	--	[2]76,977	43	Australia 75,211; Republic of South Africa 1,336; Mexico 180.
Metal including alloys, all forms	NA	--		
Zinc:				
Ore and concentrate	36,215	49,578	--	Peru 23,151; Canada 22,743; Mexico 3,683.
Oxides	180	347	19	Uruguay 200; Netherlands 100; West Germany 27.
Blue powder	--	15	13	West Germany 2.
Metal including alloys:				
Unwrought	[3]59,519	27,303	--	Mexico 10,721; Canada 8,601; Peru 7,256.
Semimanufactures	[4]11	78	--	Belgium-Luxembourg 77.
Other:				
Ores and concentrates	63,409	448	--	Thailand 207; Bolivia 155; Austria 63.
Ashes and residues	3,419	4,667	737	Venezuela 2,100; Canada 1,830.
Base metals including alloys, all forms	1,989	1,515	244	Republic of South Africa 699; Mexico 187; Netherlands 86.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,039	1,184	447	Italy 608; Mexico 100; West Germany 26.
Artificial: Corundum	895	249	81	France 114; West Germany 27; Japan 17.
Dust and powder of precious and semiprecious stones, excluding diamond value, thousands	$4,834	$3,532	$2,440	West Germany $682; Ireland $387; Denmark $15.

See footnotes at end of table.

Table 3.—Brazil: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Abrasives, n.e.s. —Continued				
Grinding and polishing wheels and stones	362	300	134	West Germany 94; United Kingdom 20; Japan 19.
Asbestos, crude	24,799	13,020	179	Canada 9,807; Italy 1,671; Republic of South Africa 1,354.
Barite and witherite	175	74	--	West Germany 60; Switzerland 13.
Boron materials:				
Crude natural borates	6,455	14,887	1,954	Peru 6,800; Turkey 5,000; Argentina 433.
Oxides and acids	5,702	6,424	1,912	Argentina 2,348; Turkey 1,000; France 836.
Cement	26,342	6,899	2,192	Peru 2,000; France 1,706; Uruguay 750.
Chalk	525	378	--	Belgium-Luxembourg 300; France 75; West Germany 3.
Clays and clay products:				
Crude, unspecified	18,378	19,746	14,138	Argentina 3,401; Republic of South Africa 1,000; France 901.
Products:				
Nonrefractory	364	384	--	Italy 368; West Germany 15.
Refractory including nonclay brick	23,729	74,326	4,132	Italy 48,103; Japan 15,895; West Germany 2,986.
Cryolite and chiolite	83	108	--	Denmark 107; West Germany 1.
Diamond:				
Gem, not set or strung value, thousands	$4,476	$1,099	--	Israel $761; Belgium-Luxembourg $338.
Industrial do.	$1,669	$1,069	$274	Ireland $319; Belgium-Luxembourg $300; West Germany $147.
Diatomite and other infusorial earth	1,535	2,127	542	Mexico 1,071; West Germany 514.
Feldspar, fluorspar, related materials:				
Unspecified	10,931	13,541	--	Mexico 13,534; West Germany 6; Switzerland 1.
Fertilizer materials:				
Crude, n.e.s	1,001	15	--	Japan 14.
Manufactured:				
Ammonia	234,895	175,408	29,992	Mexico 129,975; Venezuela 15,438; Japan 2.
Nitrogenous -- thousand tons	1,429	964	566	Netherlands 155; West Germany 114; Venezuela 43.
Phosphatic	418,150	161,866	117,184	Portugal 20,000; Uruguay 17,154; Egypt 4,950.
Potassic thousand tons	2,186	1,274	260	Canada 406; East Germany 306; West Germany 130.
Unspecified and mixed	513,503	237,032	165,346	Chile 70,451; Japan 1,015; Netherlands 100.
Graphite, natural	69	57	18	Madagascar 31; West Germany 7; Japan 1.
Gypsum and plaster	1,706	1,002	3	Bolivia 998.
Halogens:				
Chlorine	--	12	12	
Unspecified	201	169	--	Chile 117; Israel 39; Japan 7.
Lime	40	51	--	Mainly from Belgium-Luxembourg.
Magnesium compounds: Magnesite	3,193	849	433	West Germany 205; Republic of South Africa 96; France 48.
Mica:				
Crude including splittings and waste	153	170	--	Canada 163; Norway 3; United Kingdom 2.
Worked including agglomerated splittings	112	144	44	Switzerland 57; France 26; Belgium-Luxembourg 17.
Nitrates, crude	18,030	14,350	--	All from Chile.
Phosphates, crude	772,154	466,309	124,009	Morocco 195,646; Israel 146,653.
Pigments, mineral: Iron oxides and hydroxides, processed	2,662	1,619	184	West Germany 1,162; Netherlands 160; Spain 109.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$354	$117	$25	Switzerland $54; France $30; Republic of South Africa $5.
Synthetic do.	$120	$129	$59	Switzerland $68; Austria $2.

See footnotes at end of table.

Table 3.—Brazil: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pyrite, unroasted	129	195	95	West Germany 100.
Salt and brine	4	4	(1)	United Kingdom 3.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	8,157	2,606	--	France 1,371; Spain 478; West Germany 395.
Sodium carbonate, natural and manufactured	224,645	118,403	81,487	France 19,251; West Germany 12,410; United Kingdom 2,734.
Sodium hydroxide	11,954	13,660	1,627	West Germany 5,891; United Kingdom 1,479; Poland 1,400.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	356	142	1	Japan 84; Italy 53; France 4.
Worked	109	19	--	Portugal 15; Hong Kong 2; West Germany 2.
Dolomite, chiefly refractory-grade	6,425	4,671	--	Uruguay 3,900; Italy 770.
Gravel and crushed rock	6	144	--	France 139; West Germany 5.
Limestone other than dimension				
value, thousands	$2,000	--		
Quartz and quartzite	13	8	5	West Germany 3.
Sand other than metal-bearing	2,554	19,185	32	Canada 18,720; Argentina 417; United Kingdom 14.
Sulfur:				
Elemental:				
Crude including native and by-product	939,092	817,072	63,401	Canada 563,803; Poland 121,840; Netherlands Antilles 58,694.
Colloidal, precipitated, sublimed	657	472	467	West Germany 5.
Sulfuric acid	96,734	113,938	2	Netherlands 45,868; West Germany 36,555; Norway 29,083.
Talc, steatite, soapstone, pyrophyllite	117	86	76	West Germany 5; Norway 5.
Other:				
Crude	11,707	11,177	2,295	Republic of South Africa 4,568; Australia 3,532; Japan 483.
Slag and dross, not metal-bearing	1,800	2,862	--	Republic of South Africa 2,012; West Germany 850.
Oxides and hydroxides of barium, magnesium, strontium	436	327	44	West Germany 200; Italy 50; France 21.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	335	697	18	Uruguay 570; United Kingdom 86; France 12.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	287	322	291	Argentina 30.
Carbon: Carbon black	8,680	3,295	677	West Germany 1,153; Canada 911; France 326.
Coal:				
Anthracite and bituminous thousand tons	44,526	4,353	2,578	Canada 818; Poland 785; Australia 97.
Lignite including briquets	48	204	204	
Coke and semicoke	449,361	283,485	5,431	Japan 213,209; West Germany 28,006; United Kingdom 13,564.
Hydrogen, helium, rare gases	45	86	85	United Kingdom 1.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	321,184	309,465	--	Saudi Arabia 115,977; Iraq 51,731; Venezuela 29,703.
Refinery products:				
Liquefied petroleum gas do	1,334	1,574	(1)	Saudi Arabia 893; Bolivia 199; Venezuela 178.
Gasoline 42-gallon barrels	641,000	591,405	19,924	Netherlands Antilles 335,699; Italy 140,947; Venezuela 178.
Mineral jelly and wax do	10,000	2,455	150	West Germany 1,558; Republic of South Africa 441; Denmark 118.
Kerosine and jet fuel do	(1)	182,551	31,496	Trinidad and Tobago 79,135; Italy 71,920.
Distillate fuel oil do	3,564	5,932	(1)	Argentina 3,084; Kuwait 897; Mexico 721.
Lubricants do	1,009	419	125	Romania 236; Netherlands Antilles 48; Japan 6.
Nonlubricating oils do	1,935	86	3	Romania 82.
Residual fuel oil do	7,273	1,739	--	Argentina 946; Uruguay 346; Canada 326.

See footnotes at end of table.

Table 3.—Brazil: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Bituminous mixtures 42-gallon barrels	--	782	781	
Petroleum coke do	835,000	322,548	163,372	Argentina 137,616; United Kingdom 11,000; Japan 10,494.
Tars and other crude chemicals derived from coal, gas, and petroleum	25,742	4,686	3,577	West Germany 702; United Kingdom 396; Switzerland 11.

NA Not available.
[1]Less than 1/2 unit.
[2]May include molybdenum ore and concentrate.
[3]Includes scrap.
[4]Includes blue powder.

COMMODITY REVIEW

METALS

As a result of continued exploration activities by Government agencies and private sector companies, DNPM reported substantial increases in the measured reserves of nickel (40%), zinc (32%), and aluminum (27%).[4] In contrast, measured reserves of gold were reported to have diminished almost 26% during the year. Measured reserve figures published by DNPM are those that are officially approved by the Government on the basis of annual mine reports and final reports on exploration work.

Alumina, Aluminum, and Bauxite.—Negotiations were held toward yearend between CVRD, the state mining company, and its Japanese partner, Nippon Amazon Aluminum Co. (NALCO), a consortium of 32 Japanese firms, concerning the future of Alumina do Norte do Brasil S.A.'s (ALUNORTE) 800,000-ton-per-year alumina refinery due to come onstream in 1984 at Barcarena, Pará State. Earlier in the year, NALCO proposed a 3-year freeze on the construction of the alumina plant, believed to have been 20% completed at yearend, owing to the depressed world market and Brazil's own worsening financial situation. The discussions reportedly included consideration of a reduction in planned capacity, a rescheduling of the timetable, and even a pullout by NALCO. The delay, and possible cancellation of the project, threatened to adversely impact plans being implemented to expand the annual production capacity of the Trombetas bauxite deposits from 3.5 million to 8 million tons. NALCO has a 39% interest in the $214 million refinery project with ALUNORTE, which in turn is a wholly owned subsidiary of CVRD.

Alumínio Brasileiro Ltda. (ALBRAS) was scheduled to bring its aluminum smelter, also located at Barcarena, into production in 1985 with an initial capacity of 40,000 tons per year, adding a further 120,000 tons per year in 1986. NALCO has a 49% interest in the $547 million smelter project with ALBRAS which, like ALUNORTE, is a wholly owned subsidiary of CVRD.

Earlier in the year, ALUNORTE was merged with ALBRAS into a single concern called Consorcio de Alumínio Albras e Alunorte S.A. The linkup will keep the legal structure of the two concerns separate but will allow the management to be run by one board of directors. Both companies will continue to have their own separate capital and investment requirements.

Vereinigte Aluminium Werke AG of the Federal Republic of Germany postponed indefinitely the construction of its 220,000-ton-per-year, two-stage, $800 million Alune aluminum smelter near Recife in the northeastern State of Pernambuco owing to yet-undefined electricity costs, as well as the depressed world market. Construction of the smelter was originally scheduled to begin in late 1983.

Valesul Alumínio S.A.'s aluminum smelter, Brazil's fifth, located 40 kilometers southwest of Rio de Janeiro at Santa Cruz, came onstream in May. Production, originally scheduled to be 40,000 tons of aluminum in 1982 and increasing to the design capacity of 86,000 tons per year in

1983 was estimated to be 30,000 tons owing to the weakness of the world aluminum market.

Work progressed on the 500,000-ton-per-year alumina refinery and 100,000-ton-per-year aluminum smelter complex at São Luis, Maranhão State, during the year. The $1.5 billion project, owned by Alumínio do Maranhão S.A., a joint venture of Alcoa Alumínio do Brasil S.A. (60%), and two subsidiaries of the Royal Dutch/Shell Group, Shell do Brasil S.A. and Billiton International Metals BV, was about 35% complete by yearend. The projected startup date for the processing of bauxite, to be obtained from the Trombetas deposits, was early 1984.

An expansion of Mineração Rio do Norte S.A.'s (MRN) Trombetas bauxite operations in Pará State was being considered throughout the year. The proposed $400 million expansion would increase production from 3.5 million tons per year to 8 million tons per year. MRN, the largest producer and exporter of bauxite in Brazil, was owned by CVRD (46%), Alcan Alumínio da America Latina (24%), Mineração Rio Xingu S.A. (10%), Cia. Brasileira de Alumínio (10%), Norsk Hydro Comércio e Indústria Ltda. (5%), and Reynolds Metals Co. (5%).

Columbium (Niobium).—Cia. Brasileira de Metalurgia e Mineração (CBMM) began experimental production of 99.99% pure columbium metal from columbium oxides of 99% purity at a pilot plant in Lorena, São Paulo State. The metal will be tested against international quality standards before being marketed. CBMM was planning to add a commercial-scale facility to its operations at Araxá, Minas Gerais State.

Copper.—Eluma S.A. Indústria y Comércio, the largest Brazilian copper company, was leading a consortium of six companies in an attempt to purchase the 150,000-ton-per-year Caraiba Metais copper smelter and refinery from the Government at yearend. The proposed sale of the $1.2 billion facility, located in Bahia State, was part of the Government's wide-ranging plan to sell many of its state-owned companies. The nearby La Caraiba mines were to be included in the sale. The Caraiba Metais smelter began production trials in August and was officially inaugurated in October. Commercial production was scheduled to begin early in 1983.

Eluma was also planning to initiate a Government-approved $900 million copper project, including a smelter and refinery in the southern State of Rio Grande do Sul, and a mine in Goiás State. However, to date, the project has not progressed beyond obtaining approval owing to the possibility of purchasing the Caraiba Metais plant.

Exploration for copper in the Carajás region was opened to private company participation late in the year. CVRD's research arm, Rio Doce Geologia e Mineração S.A. (DOCEGEO), began delineation of the reserves at its Salabo deposit in the Carajás region, which were estimated to be 1.2 billion tons grading at 0.83% copper. Sufficient reserves were outlined to warrant the construction of a 3-ton-per-hour pilot plant at a total cost of $4 million. The plant was due to begin processing ore early in 1983.

Gold.—A study conducted by Cia. de Pesquisa de Recursos Minerais identified reserves of ore containing 900 tons of gold in the Tapajós region of Pará State. Reportedly, the find is of sufficient grade to be suitable for commercial operations.

A 19.145-kilogram nugget, containing 17.613 kilograms of gold, was discovered in September at Serra Pelada, the Government-owned mine in Pará State. Gold production at Serra Pelada nearly tripled in 1982 to 219,263 troy ounces, up from 83,333 troy ounces in 1981. Detailed drilling, trenching, and geological mapping at the site have outlined a reserve of 30 tons of gold.

Mineração Morro Velho S.A. commissioned its new Morro do Vento Mine and 20,000-ton-per-month treatment plant at Jacobina, Bahia State, during the year. The mine will produce about 1.4 tons per year of gold.

Iron Ore.—CVRD, the world's largest iron ore producer, shipped for export and domestic consumption iron ore products at a level that was the third highest in 40 years. The total amounted to 73.0 million tons shipped from CVRD's own operations, three pellet plant joint ventures, and two associated companies. This total compares with the levels of iron ore shipments by CVRD to the alltime high records of 80.1 million tons in 1980 and 79.0 million tons in 1979. However, iron ore exports, predominantly to the Federal Republic of Germany, Japan, and the United States, fell from 79.7 million tons in 1981 to 71.5 million tons in 1982, a 10.3% decline.

Brazil's second largest exporter of iron ore, Minerações Brasilieras Reunidas S.A. (MBR), received Government approval for an expansion project to double the current production of 15 million tons per year to 30 million tons per year by the late 1980's at a

cost of $255 million. MBR was owned 49% by St. John d'El Rey Mining Co. Ltd., a subsidiary of the Hanna Mining Co. of the United States.

The Capanema Mine at Ouro Preto, Minas Gerais State, began operations in mid-year. The mine, developed by Cia. de Mineração Serra Gerol S.A., a joint venture company formed by CVRD (51%) and a consortium of eight Japanese companies led by the Kawasaki Steel Corp. (24.5%) at a cost of $125 million, will produce 11.5 million tons per year of ore when full capacity is attained in 1983. The plant at the nearby Timbopeba Mine, which also came on-stream during the year, will treat the ore from both mines. Production at Timbopeba will be 7.5 million tons per year when the mine reaches full capacity.

Manganese.—The concession to mine the 45-million-ton Igarapé Azul manganese deposit in the Carajás region of Pará State was awarded by the Government to state-owned CVRD in September rather than to several interested private enterprises that had submitted proposals. CVRD had made a considerable investment in developing manganese mining in the region and was producing battery-grade ore on a small scale for domestic consumption. DOCEGEO, the CVRD mining and prospecting subsidiary, will operate the mine, export up to 25% of production, and sell the remainder to domestic producers of ferromanganese alloys. Through yearend, $12.5 million of a projected $50 million total was invested in a concentration plant, mining equipment, and vehicles. The mine is scheduled to initially produce 500,000 tons of concentrates per year, increasing to 1.1 million tons per year during the latter part of the decade. The installation of a ferromanganese plant, with an initial capacity of 150,000 tons per year, and hydroelectric facilities were also slated for the region.

Nickel.—Empresa de Desenvolvimento de Recursos Minerais S.A. (CODEMIN) commissioned a $100 million open pit nickel mine and adjacent smelter near Niquelandia, 175 kilometers north of Brasilia in the State of Goiás, near yearend. Average nickel content of the lateritic ores ranges from 1.4% to 1.8% and proven reserves were sufficient for a 20-year mine life. CODEMIN was principally owned by the Hochschild Group (55%), which will also operate as manager, and the Anglo American Corp. do Brasil. The International Finance Corp. of the International Bank for Reconstruction and Development (World Bank) provided a $60 million, long-term loan for the project in 1979 and held a 10% equity interest. The project was designed to produce 5,000 to 5,900 tons of contained nickel per year in the form of ferronickel for sale in the domestic market. Brazil has had a deficit in ferronickel since 1978 and the imbalance was expected to continue increasing for the foreseeable future.

Tin.—Paranapanema S.A. Mineração, Indústria e Construção, Brazil's largest tin producer, announced its intent to double its 1981 production of 3,500 tons by developing a tin deposit located north of Manaus in Amazonas State. Contained reserves are estimated at 60,000 tons. Early in the year Paranapanema began production of 80 tons of concentrates per month at a deposit located east of Xingu in the Carajás region of Pará State.

Mineração Brumadinho S.A., Paranapanema's chief competitor, was planning two expansion projects, a 500-ton-per-year dredging operation in Rondônia, and a 750-ton-per-year primary tin mining operation in Goiás State.

Brascan Recursos Naturais S.A. announced plans to invest $50 million for tin exploration and mining in Rondônia State.

Titanium.—Metais de Minas, a state-owned enterprise, was planning to construct a 3,000-ton-per-year titanium sponge plant, Brazil's first, at Belo Horizonte in Minas Gerais State. The target date for startup was 1984. The $280 million project will include construction of a 50,000-ton-per-year titanium dioxide pigment plant, an ore concentration plant, and a titanium tetrachloride plant for sponge production. A demonstration pilot plant, based on secondary titanium dioxide ore (anatase) mined near Araxá, Minas Gerais, was under construction by Centro Técnico Aeroespacial, an agency under the Ministry of Aeronautics, at São Jose dos Campos, São Paulo State. The center developed a patented process for producing sponge titanium. Titanio do Brasil (TIBRAS), a private Brazilian company, was the only titanium producer in Brazil. TIBRAS' 300,000-ton-per-year pigment plant at Salvador, Bahia State, used Australian ilmenite as feed.

Zinc.—Cia. Mineira de Metais S.A., Brazil's largest producer of zinc, began production of 99% zinc oxide at its plant at Tres Maria. Plant capacity is 1,000 tons per month.

NONMETALS

As of yearend 1981, DNPM reported substantial increases in the measured reserves of fluorite, 55%; vermiculite, 44%; kaolin, 39%; limestone, 22%; and calcite, 12%.[5]

Diamond.—Morro Vermelho Ltda. initiated a pilot alluvial diamond mining project near Cuiabá, Mato Grosso State, in November. Morro Vermelho was the first to use heavy media separation techniques in Brazil. Should the testwork prove successful, diamond output of 60,000 to 70,000 carats annually, 90% of which are estimated to be of gem quality, is anticipated.

Phosphate Rock.—The Bank of America reportedly approved a $20 million loan to Indústria de Fosfatados Catarinense (IFC) to finance the infrastructure for IFC's 600,000-ton-per-year phosphate rock project at Anitápolis, Santa Catarina State. Total investment for the project, scheduled to begin production of phosphate concentrate in early 1985, was estimated to be $120 million, including the construction of an 80-kilometer pipeline to transport the concentrate from the plantsite to the Port of Imbituba.

Mineração do Cerrado S.A. sold its Lager Mine to Trevo S.A., headquartered in Rio Grande do Sul State, for $8 million early in the year. The Lager Mine, located in Minas Gerais State near the Patos de Minas, was reportedly the principal privately held phosphate reserve in Brazil.

Potassium.—The Taquari-Vassouras potash mine and fertilizer processing center, located at Carmópolis in Sergipe State, was officially inaugurated in midyear. Petrobras Mineração S.A. (PETROMISA), a subsidiary of the state-owned oil monopoly Petróleo Brasileiro S.A. (PETROBRÁS), planned to have the potash complex onstream by the beginning of 1984. At full capacity it will produce 500,000 tons per year of potassium chloride extracted from 2 million tons per year of sylvite ore. The $160 million project will initially help to reduce Brazil's huge imports of potash and subsequently bring the country to self-sufficiency. In 1982, Brazil was the world's second largest importer of potash. The Sergipe potassium deposits were discovered by PETROBRÁS during petroleum exploration drilling in 1963-64.

PETROMISA was studying the possibility of constructing a complex for the production of up to 1.5 million tons per year of potassium chloride at its Fazendinha-Uraria deposit, 130 kilometers southeast of Manaus, Amazonas State, in the Amazon Basin. The Amazon deposit, also discovered by PETROBRÁS, continued to be evaluated during the year, with an estimated 134 million tons of ore tentatively identified.

MINERAL FUELS

Alcohol Fuel Program.—Aided by subsidized Government loans to build distilleries and by an administered price advantage over gasoline, the Brazilian National Alcohol Program (PROALCOOL) attained the capacity to produce over 5 billion liters of alcohol per year to fuel a fleet of 1 million vehicles during the year. In addition, alcohol was widely used in vehicles throughout the country in an admixture of up to 20% to extend the gasoline supply. Reportedly, the use of alcohol as a fuel has reduced the imported oil bill by $1.5 billion.

The World Bank released an $80 million parcel of a $250 million, 4-year loan toward yearend, marking the first international source of funding for PROALCOOL.

The first commercial-scale fuel alcohol plant using the Biostil process went onstream in August at the São Luis distillery in southern Brazil. This process was developed by the Swedish firm Alfa-Laval for the continuous fermentation and distillation of alcohol. The plant produced 150,000 liters per day of 96% ethanol from a feedstock of 30% final molasses and 70% cane juice syrup.

Coal.—The goals of PROCARVÃO, the ambitious Brazilian National Coal Program, were reduced during the year, owing principally to the third consecutive year of recession, but also to declining petroleum prices and increased domestic oil production. Instead of the 19.5-million-ton annual production called for by PROCARVÃO by 1985, a more modest 9.5-million-ton goal was projected. Projections for slower economic growth and less rigorous demand for electrical energy were reflected in the reduced goals. The scheduled construction of several coal-powered thermoelectric generating plants was also slowed in keeping with anticipated economic growth.

Official Brazilian figures estimate that the country's coal reserves, 23 billion tons or 4.3 billion tons oil equivalent, are by far the greatest reserves of energy Brazil possesses.[6] In contrast, known Brazilian oilfields contain just under 200 million tons oil equivalent. Over 80% of the coal reserves are in Rio Grande do Sul State.

Estimated coal production during 1982

was 6.2 million tons, of which 1.2 million tons was of metallurgical grade and 5 million tons of steam coal.

Natural Gas.—Natural gas production was 107 billion cubic feet, an increase of more than 21% over that of 1981, for an average production of 293 million cubic feet per day. However, only about two-thirds of the total was used commercially, with the rest being flared. PETROBRÁS was actively engaged in research and feasibility studies in order to increase gas utilization during the year.

Brazil increased its natural gas reserves to 2,554 trillion cubic feet, a 20% increase over that of 1981. The increase was largely due to a doubling of the nonassociated gas, to 350 billion cubic feet, in the Upper Amazon Basin 800 kilometers west of Manaus, Amazonas State. Also contributing to the increase was the delineation of the Juruá and Jaraqui Fields, as well as new discoveries of associated gas in the Campos Basin, off Rio de Janeiro State.

The proposed 1,940-kilometer pipeline to link natural gasfields near Santa Cruz, Bolivia, to São Paulo came closer to fruition during the year. The final engineering study was turned over to PETROBRÁS in late August by Snamprojetos Engenharia S.A., the Brazilian subsidiary of the Italian firm Snamprogetti S.p.A. PETROBRÁS, in turn, presented it to Yacimientos Petrolíferos Fiscales Bolivianos, the Bolivian state oil corporation, in La Paz. The study was accepted by both Bolivia and Brazil, but detailed negotiations were still proceeding at yearend.

The pipeline will provide 390-million-cubic-feet-per-day of natural gas and could begin flowing by 1987. The estimated cost of the project was $1.7 billion. The World Bank has offered to provide $350 million toward construction of the 570 kilometers of 30-inch pipeline from Santa Cruz, Bolivia, to Corumbá and $800 million for the remaining 1,370 kilometers of 28-inch pipeline to São Paulo, provided that international biddings are held for the orders. The Bolivian gasfields are estimated to contain 35.3 trillion cubic feet of reserves.

Petroleum.—PETROBRÁS, the state oil monopoly formed in 1953, continued to concentrate its priorities into exploration and production activities during 1982 with the objective of reducing Brazil's external dependence on oil supplies and improving the balance of payments. As a result, Brazil's crude oil output, including natural gas liquids, increased 21.6% over that of 1981 to an alltime record. Production increased from an average of 220,000 barrels per day in 1981 to a record 268,000 barrels per day in 1982. Offshore fields produced 53% of the total compared with 46% in 1981. A new daily production record of 325,912 barrels was established in late December. PETROBRÁS anticipates reaching 400,000 barrels per day output by yearend 1983. This will be about 358,000 barrels per day on an annual basis. Eventually their objective is to produce 500,000 barrels per day of domestic crude by 1985.

Brazil imported nearly 70% of its 1982 crude oil consumption requirements. Consumption averaged slightly over 1 million barrels per day, a 0.2% increase from the 1981 level.

By directing 81% of its total investments into exploration and production programs, PETROBRÁS increased recoverable liquid hydrocarbon reserves almost 17%, to 1,735 billion barrels. During the year, 97.7 million barrels of crude oil and natural gas liquids was produced. The increase was largely due to the discovery of new fields and the delineation of existing fields in the Campos Basin off the coast of Rio de Janeiro State. The Campos Basin, producing almost 40% of domestic petroleum output, surpassed that of Bahia State during the year to become the country's single leading production area.

The exploration efforts of PETROBRÁS in 1982 included 190 wells drilled onshore and 113 wells drilled on the Continental Shelf. Among the onshore wells, 41 were found to be oil-producing; 6, gas-producing; and 13, both oil- and gas-producing. Of the 113 offshore wells, 33 were found to be oil-producing; 1, gas-producing; and 4, both oil- and gas-producing. Drilling operations were carried out onshore in 11 States and Territories from Roraima Territory to Espírito Santo State and off the coasts of 11 States from Pará State to São Paulo State. Brazilian oil and gas production during the year was from 2,439 wells—2,040 onshore and 399 offshore.

During the year, 26 new drilling rigs, divided evenly between onshore and offshore use, became operational. PETROBRÁS owned 8 and 18 were contracted. At yearend, 94 rigs were in operation, 58 onshore and 36 offshore.

For the second consecutive year, 1 million meters were drilled. Total drilling was 1,524,000 meters, an increase of 43% over

that of 1981, of which 677,000 meters was for exploration and 841,000 meters was for production development. The balance was special well drilling.

Risk contract exploration in 1982 did not lead to any commercially viable discoveries of hydrocarbons. However, the contract discovery made in 1981 off the coast of Bahia State by the Pectin do Brasil-Chevron Oil Co.-Union Oil Co. consortium continued to be evaluated with additional seismic surveys and drilling.

Thirteen private risk contract companies operated under PETROBRÁS authorization during 1982, including one domestic driller. PETROBRÁS had signed 23 new risk contracts by yearend, bringing the total signed since 1976 to 125.

Table 4.—Brazil: Crude oil and natural gas liquids production by Petróleo Brasileiro S.A.

Area	Production (thousand 42-gallon barrels)		Share, percent		Change, percent
	1981	1982	1981	1982	
Alagoas	1,076	1,459	1.3	1.5	+35.6
Bahia	r28,877	28,487	35.9	29.2	-1.4
Ceará	2,541	3,585	3.2	3.6	+41.1
Espírito Santo	5,768	6,372	7.2	6.5	+10.5
Rio de Janeiro	19,687	33,783	24.5	34.6	+71.6
Rio Grande do Norte	5,183	6,353	6.5	6.5	+22.6
Sergipe	17,190	17,649	21.4	18.1	+2.7
Total	r80,322	97,688	100.0	100.0	+21.6
Onshore	43,771	46,181	54.5	47.3	+5.5
Offshore	36,551	51,507	45.5	52.7	+40.9

rRevised.

Source: Annual Report of Petróleo Brasileiro S.A., 1982.

Uranium-Nuclear Energy.—Brazil's first nuclear powerplant, the 626-megawatt Angra I, located near Rio de Janeiro, began trial operation in April and was inaugurated in May. However, the plant reportedly had design problems in its steam generator preheating system and was shut down following the inaugural tests. It was expected to be online early in 1983.

Initial operation of Angra II, Brazil's second nuclear reactor and the first to be built under accords with the Federal Republic of Germany, was moved back from 1986 to 1987; decelerated work on the Angra III reactor will also delay its operational target date by at least 1 year, to 1989.

Work on the Iquape I and Iquape II reactors, located on the south shore of São Paulo State and originally scheduled to begin operations in 1991, was indefinitely postponed.

The construction of a plant for the conversion of uranium concentrates to uranium hexafluoride, the intermediate stage between concentration and enrichment, was awarded to Uranium Péchiney Ugine Kuhlmann of France at yearend. The new facility, located at Resende, Rio de Janeiro State, was scheduled to be operational by 1985.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Brazilian cruzeiros (Cr$) to U.S. dollars at the rate of Cr$251.41 = US$1.00 as of Dec. 31, 1982.

[3]Departamento Nacional da Produção Mineral. Anúario Mineral Brasileiro—1982. Annual report covers 1981 data.

[4]Page 25 of work cited in footnote 3.

[5]Page 26 of work cited in footnote 3.

[6]Ministry of Mines and Energy. National Energy Balance—1982, p. 80.

The Mineral Industry of Bulgaria

By Tatiana Karpinsky[1]

The industrial production and national income of Bulgaria increased 4.6% and 4%, respectively, in 1982. Almost the entire growth of the national income resulted from increased labor productivity. Capital investment decreased from 6.7 billion lev (L) in 1981 to L6.5 billion in 1982.[2] About 38% of this was used for renovation and development of existing industrial facilities.[3] Output of the power industry increased 9.3%, output of the metallurgy and mineral industry increased 2.4%, and output of the construction industry increased 0.6%. Bulgaria produced more than 70% of its needs in rolled steel and more than 90% of its needs in nonferrous metals and alloys. Major projects put into operation included two electric furnaces at the Lenin iron and steel combine at Pernik, with a total annual production capacity of 500,000 tons of steel; the fourth 440-megawatt block of the Kozloduy atomic powerplant; and a catalytic cracking installation for processing crude oil at the Burgas petrochemical complex. Four coal mines were under development, and two opencast mines were being expanded. An agreement on cooperation in geological exploration for oil and gas on Bulgaria's Continental Shelf was signed with the U.S.S.R. The Assarel copper complex, with a projected capacity of 15 million tons of ore, was under development. This would be one of the largest such complexes in Europe. An additional 450,000 tons of ammonia capacity was added at the Dimitrovgrad plant. Production of nitric acid started in the Stara Zagora plant. Late in 1981 the third and final stage of installations for the ferry service between Bulgaria and the U.S.S.R. was completed at Ilyichevsk.

Government Policies and Programs.—In December, the National Assembly approved the plan for Bulgaria's economic development in 1983. The targets appeared to be scaled slightly higher than those of the 1982 plan but were rather modest as compared with the annual growth during the preceding 5-year period, 1976-80.

PRODUCTION

Bulgaria's plan for overall industrial output was reportedly fulfilled. In comparison with the 1981 figures, production slightly increased in the coal, steel, nitrogen fertilizer, and power industries. Production of steel-rolled products and phosphoric fertilizers was lower than in 1981.

In 1982, 40.2 billion kilowatt-hours of electric energy was produced; the Kozloduy nuclear powerplant generated about 7 billion kilowatt-hours or 17% of the total. The share of electrical energy produced by nuclear plants was expected to be 30% in 1985 and 50% at the end of the century.

At the end of 1982, the population of Bulgaria amounted to 8.9 million. Total industrial employment was about 1.2 million in 1981, of which the coal industry employed 45,700; ferrous metallurgy, including ore mining, 34,600; the engineering and metal-working industry, 235,000; and production of electric energy, 27,100.

Table 1.—Bulgaria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Cadmium metal, smelter[e]	210	210	210	210	210
Copper:					
Mine output, metal content	58,000	58,000	r60,000	62,000	63,000
Metal, primary and secondary:					
Smelter	64,000	64,000	64,000	64,000	64,000
Refined	62,000	62,000	r63,000	62,000	62,000
Iron and steel:					
Iron ore:					
Gross weight thousand tons	2,452	2,103	1,886	1,754	3 1,552
Fe content do	762	651	590	537	3 474
Iron concentrates do	1,080	960	921	912	3 802
Metal:					
Pig iron do	1,493	1,450	1,527	1,512	3 1,564
Ferroalloys, electric-furnace, all types do	46	45	45	55	3 55
Steel, crude do	2,470	2,482	2,567	2,483	3 2,586
Semimanufactures, rolled do	3,050	3,128	3,213	3,351	3,300
Lead:					
Mine output, metal content[e]	r110,000	r108,000	r100,000	r96,000	96,000
Metal, smelter, primary and secondary	r125,000	r120,000	r118,000	e123,000	123,000
Manganese ore:					
Gross weight	40,000	42,000	49,000	45,321	45,000
Mn content	11,000	12,300	14,200	13,207	13,000
Molybdenum, mine output, metal content[e]	150	150	150	150	150
Silver, mine output, metal content[e] thousand troy ounces	900	920	930	930	930
Zinc:					
Mine output, metal content	r78,000	r75,000	r70,000	e65,000	65,000
Metal, smelter, primary and secondary	91,000	89,000	90,000	90,000	90,000
NONMETALS					
Asbestos	700	600	700	400	400
Cement, hydraulic thousand tons	5,149	5,401	5,429	5,443	3 5,614
Clays: Kaolin	199,000	202,000	208,000	221,422	225,000
Gypsum and anhydrite:					
Crude thousand tons	340	309	311	350	350
Calcined	82	80	88	e85	85
Lime: Quicklime thousand tons	1,782	1,868	1,870	1,758	1,700
Nitrogen: N content of ammonia	787,200	779,820	827,000	838,000	3 760,000
Pyrites, gross weight[e]	705,000	715,000	680,000	680,000	680,000
Salt, all types	87,000	86,000	87,000	e87,000	87,000
Sodium compounds, n.e.s.:					
Caustic soda thousand tons	106	115	168	e168	168
Sodium carbonate, calcined do	1,294	1,498	1,479	1,469	1,500
Sulfur:					
S content of pyrites[e]	310,000	315,000	300,000	300,000	300,000
Byproduct, all sources[e]	70,000	75,000	70,000	70,000	70,000
Total[e]	380,000	390,000	370,000	370,000	370,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, marketable:					
Anthracite thousand tons	102	104	97	246	3 241
Bituminous do	171	170	170		
Brown do	5,797	5,855	5,793	5,654	3 5,528
Lignite do	19,733	22,100	24,153	23,324	3 26,414
Total do	25,803	28,229	30,213	29,224	32,183
Coke do	1,411	1,351	1,348	1,381	3 1,283
Natural gas, marketed million cubic feet	1,140	4,820	6,714	4,840	4,840
Petroleum:					
Crude:					
As reported thousand tons	180	180	180	180	180
Converted thousand 42-gallon barrels	1,314	1,314	1,314	1,314	1,314
Refinery products:					
Gasoline do	14,620	15,300	r15,725	NA	NA
Kerosine do	1,550	1,705	r1,783	NA	NA
Distillate fuel oil do	24,618	25,737	r26,110	NA	NA
Residual fuel oil do	36,630	38,628	r39,960	NA	NA

See footnotes at end of table.

Table 1.—Bulgaria: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products —Continued					
Lubricants thousand 42-gallon barrels	770	--	--	NA	NA
Liquefied petroleum gas do	754	812	[r]870	NA	NA
Asphalt including natural do	3,636	3,700	--	NA	NA
Total do	82,578	[r]85,882	[r]84,448	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 1, 1983.

[2]In addition to the commodities listed, bismuth, chromite, gold, palladium, platinum, tellurium, uranium, barite, fluorspar, magnesite, and a variety of crude construction materials (common clays, sand and gravel, dimension stone, and crushed stone) are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

TRADE

In 1982, total imports were valued at L10.8 billion and exports at L10.7 billion. Imports of fuels, minerals, and metals accounted for about 46% of total imports, and exports of this group for 12% of total exports. The centrally planned economy countries accounted for 75% of the total trade, and the Soviet Union's share amounted to about 54%. Trade with the developing countries increased considerably. Bulgaria's main interest in trade with the West was import of technology, which will allow it to modernize its industrial base and to utilize raw materials and energy more efficiently.

Table 2.—Bulgaria: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	--	171	--	Italy 161.
Aluminum:				
Ore and concentrate value, thousands	$8	NA		
Metal including alloys:				
Scrap	604	325	--	Italy 189; West Germany 136.
Unwrought	4,817	3,600	--	Japan 3,084; Italy 396.
Semimanufactures	606	14	--	Italy 13.
Cadmium: Metal including alloys, all forms	52	20	--	All to West Germany.
Copper:				
Matte and speiss including cement copper	17	NA		
Metal including alloys:				
Scrap	646	734	--	West Germany 445; Switzerland 229.
Unwrought	1,969	303	--	West Germany 228; France 75.
Semimanufactures	526	117	--	Libya 82; Morocco 28.
Gold:				
Waste and sweepings troy ounces	NA	1,010	--	All to West Germany
Metal including alloys, unwrought and partly wrought do	NA	4,308	--	All to Switzerland.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	4	NA		

See footnotes at end of table.

Table 2.—Bulgaria: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Scrap[2]	155,000	85,000	--	Austria 38,481; Italy 20,656; Greece 9,409.
Pig iron, cast iron, related materials[3]	34,400	33,500	--	NA.
Ferroalloys:				
Ferrochromium	NA	4,489	--	Austria 2,187; Netherlands 896; West Germany 778.
Ferrosilicon	NA	5,999	--	West Germany 3,764; Austria 835; Switzerland 504.
Unspecified[2]	23,000	21,000	--	NA.
Steel, primary forms	387,508	224,094	--	Italy 73,364; West Germany 46,749; Austria 42,238.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	155,000	139,000	--	Egypt 47,801; Poland 43,311.
Universals, plates, sheets[2]	545,000	665,000	--	West Germany 110,493;[4] India 42,017;[4] Austria 32,376.[4]
Hoop and strip	[5]22,287	10,367	--	Greece 10,356.
Rails and accessories	51	2	--	All to Libya.
Wire[2]	30,000	32,000	--	NA.
Tubes, pipes, fittings[3]	65,000	60,900	--	Poland 10,294; Italy 2,002; unspecified 43,654.
Castings and forgings, rough	1,143	644	--	Greenland 621.
Lead:				
Oxides	1,810	1,548	--	Yugoslavia 822; Egypt 525; Spain 100.
Metal including alloys:				
Unwrought	7,882	3,953	--	Greece 2,959; Yugoslavia 994.
Semimanufactures	7	2	--	All to Libya.
Manganese: Ore and concentrate, metallurgical-grade[3]	5,600	5,500	--	All to Hungary.
Metalloids: Unspecified	32	33	--	All to West Germany.
Molybdenum: Ore and concentrate	--	249	--	Do.
Nickel: Metal including alloys, scrap	22	25	--	United Kingdom 12; West Germany 9.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$1	$10	--	All to Switzerland.
Silver:				
Waste and sweepings[6] do	$4	$267	--	France $145; Switzerland $102.
Metal including alloys, unwrought and partly wrought do	$3,055	$789	--	West Germany $714; Netherlands $68.
Zinc: Metal including alloys:				
Scrap	18	NA		
Unwrought	10,388	10,593	--	Czechoslovakia 6,000; France 2,498; Yugoslavia 1,048.
Semimanufactures	--	5	--	All to Libya.
Other:				
Oxides and hydroxides	17	9	--	Greece 5; Yugoslavia 2.
Ashes and residues	13	46	--	Belgium-Luxembourg 23; Italy 23.
Base metals including alloys, all forms	14	3	--	All to West Germany.
NONMETALS				
Abrasives, n.e.s.:				
Artificial: Corundum	--	20	--	All to Italy.
Grinding and polishing wheels and stones	--	1	--	All to Greece.
Cement[4]	444,200	474,200	--	Libya 200,800; Switzerland 33,000; Yugoslavia 12,900.
Clays and clay products:				
Crude:				
Kaolin	5,625	3,058	--	All to Poland.
Unspecified	5,568	6,864	--	Greece 3,851; Libya 1,788; Tunisia 1,092.
Products:				
Nonrefractory[7]	2,528	182	--	Greece 144; Jordan 38.
Refractory including nonclay brick	21	61	--	All to Jordan.
Diamond:				
Gem, not set or strung value, thousands	$153	$98	--	United Kingdom $95.
Industrial do	$3,950	$4,160	--	All to Belgium-Luxembourg.
Fertilizer materials:				
Crude, unspecified	--	2,114	--	All to Jordan.

See footnotes at end of table.

Table 2.—Bulgaria: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured:				
Nitrogenous[4]	622,824	505,605	--	India 127,904; Syria 39,075; Vietnam 32,000.
Phosphatic	6,025	NA		
Unspecified and mixed	853	NA		
Halogens: Chlorine	NA	6,904	--	All to Yugoslavia.
Lime	5,111	1,088	--	All to Egypt.
Magnesium compounds: Other	--	9	--	All to France.
Mica: Crude including splittings and waste	10	NA		
Nitrates, crude[4]	6,644	8,569	--	U.S.S.R. 2,730; Czechoslovakia 1,629; Spain 1,175.
Pigments, mineral: Iron oxides and hydroxides, processed	61	NA		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$60	$1	--	All to West Germany.
Synthetic do.	$16	$304	--	West Germany $300.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	--	200	--	All to Cyprus.
Sodium carbonate, natural and manufactured[4] thousand tons	1,116	1,095	--	U.S.S.R. 452; Hungary 114; West Germany 83.
Sodium hydroxide[3]	47,200	29,600	--	Spain 8,709; Greece 3,515; Yugoslavia 3,309.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	8,775	7,526	--	Hungary 3,138; Italy 2,895; Poland 1,011.
Worked	[5]5,954	1,165	--	West Germany 1,131; Sweden 17; Austria 16.
Gravel and crushed rock	3,045	162	--	All to West Germany.
Sand other than metal-bearing	10,411	11,572	--	Greece 11,509.
Sulfur: Sulfuric acid[4]	50	--		
Other:				
Crude	10,872	14,389	--	Hungary 12,119; Libya 1,677.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	35	--	Libya 19; Italy 16.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	54	66	--	All to Italy.
Coal:				
Anthracite and bituminous	74	[3]13,300	--	NA.
Lignite including briquets	20	NA		
Peat including briquets and litter	93	NA		
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	475	526	--	Yugoslavia 288; Italy 155; Netherlands 73.
Gasoline do.	[9]495	909	--	United Kingdom 246; France 243; Spain 176.
Mineral jelly and wax do.	25	1	--	All to Austria and Italy.
Kerosine and jet fuel do.	44	55	--	Italy 19; West Germany 17; Hungary 16.
Distillate fuel oil do.	3,168	1,190	--	West Germany 439; France 357; Egypt 263.
Lubricants do.	346	215	--	Yugoslavia 1[illegible]0; Austria 40.
Residual fuel oil do.	6,147	6,269	--	Italy 2,177; Yugoslavia 1,462; France 920.
Unspecified do.	153	116	--	All to Poland.
Tars and other crude chemicals derived from coal, gas, and petroleum	6,963	5,123	--	Italy 1,797; Austria 1,326; Yugoslavia 1,253.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Bulgaria, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information, data published by the partner trade countries, and partial trade statistics of Bulgaria.

[2]For total exports only: Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[3]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

[4]Official Trade Statistics of Bulgaria.

[5]Excludes imports by Israel valued at $129,000.

[6]May include other precious metals.

[7]Excludes imports by Cyprus valued at $70,000 in 1980 and $37,000 in 1981.

[8]Excludes imports by Cyprus valued at $37,000.

[9]Excludes imports by Israel valued at $13,853,000.

Table 3.—Bulgaria: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Alkaline-earth metals	NA	10	--	All from France.
Unspecified	2	6	--	All from Austria.
Aluminum:				
Ore and concentrate	21	(2)	--	All from Switzerland.
Oxides and hydroxides	658	1,957	--	Austria 1,287; Italy 476; France 134.
Metal including alloys:				
Unwrought	9,573	15,712	--	Hungary 10,170; Yugoslavia 3,425; Austria 1,366.
Semimanufactures	9,109	8,162	--	West Germany 2,607; Italy 1,352; Austria 1,197.
Antimony:				
Ore and concentrate	150	NA		
Metal including alloys, all forms	200	400	--	All from Yugoslavia.
Chromium: Oxides and hydroxides	--	554	--	U.S.S.R. 550.
Cobalt: Metal including alloys, all forms	--	2	--	All from France.
Columbium and tantalum: Metal including alloys, all forms, tantalum	--	(2)	--	All from West Germany.
Copper:				
Ore and concentrate	890	NA		
Matte and speiss including cement copper	--	252	--	All from Yugoslavia.
Sulfate[3]	8,027	8,454	--	All from U.S.S.R.
Ash and residue containing copper	3,173	NA		
Metal including alloys:				
Unwrought	1,118	900	--	Belgium-Luxembourg 500; West Germany 400.
Semimanufactures	3,407	2,376	3	West Germany 1,449; Yugoslavia 266; Austria 259.
Gold: Metal including alloys, unwrought and partly wrought, troy ounces	NA	440	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite[3], thousand tons	2,235	2,280	--	All from U.S.S.R.
Metal:				
Scrap	360	--		
Pig iron, cast iron, related materials[3]	413,478	434,601	--	U.S.S.R. 409,722.
Ferroalloys:				
Ferrochromium	NA	42	--	All from Sweden.
Ferromanganese	NA	1,140	--	France 720; West Germany 420.
Unspecified[4], thousand tons	26	21	--	NA.
Steel, primary forms, do	[4]595	[4]708	--	Belgium-Luxembourg 28; France 27; undetermined 636.
Semimanufactures:				
Bars, rods, angles, shapes, sections, do	[4]359	[4]354	--	U.S.S.R. 65;[3] Italy 23; Austria 20; undetermined 180.
Universals, plates, sheets[3], do	275	305	--	U.S.S.R. 167; West Germany 38; France 32.
Hoop and strip[3], do	6	8	--	U.S.S.R. 6; Poland 1.
Rails and accessories, do	[4]63	[4]76	--	Austria 8; undetermined 67.
Wire, do	[4]18	[4]16	--	Austria 3; West Germany 3; Belgium-Luxembourg 2.
Tubes, pipes, fittings, do	[5]82	[5]74	(6)	West Germany 18; Spain 7; France 4.
Castings and forgings, rough[4], do	18	12	--	NA.
Lead:				
Ore and concentrate	24,526	45,710	13,013	Greece 5,430; Morocco 4,325; Yugoslavia 4,125.
Oxides	--	1	--	All from West Germany.
Metal including alloys:				
Unwrought	3,455	NA		
Semimanufactures	9	2	--	All from West Germany.
Magnesium: Metal including alloys:				
Unwrought[7]	70	140	--	Yugoslavia 110; France 30.
Semimanufactures	4	4	--	All from West Germany.
Manganese:				
Ore and concentrate, metallurgical-grade	[5]99,700	[5]114	--	All from U.S.S.R.
Oxides	182	202	--	Greece 110; Ireland 80.
Metal including alloys, all forms	--	4	--	All from West Germany.

See footnotes at end of table.

Table 3.—Bulgaria: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Mercury 76-pound flasks	--	145	--	All from Switzerland.
Metalloids:				
Silicon	NA	1,762	--	All from Yugoslavia.
Unspecified	1,795	590	--	France 574.
Molybdenum:				
Ore and concentrate	85	140	--	All from West Germany.
Metal including alloys, all forms	--	1	1	
Nickel: Metal including alloys:				
Unwrought	1	(2)	--	All from West Germany.
Semimanufactures	120	114	--	France 97; Sweden 11.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$3,235	$2,400	--	France $946; West Germany $660; Belgium-Luxembourg $441.
Silver: Metal including alloys, unwrought and partly wrought do	$887	$735	--	West Germany $413; France $121; Austria $102.
Tin:				
Oxides	12	NA		
Metal including alloys:				
Unwrought	25	(2)	(2)	All from West Germany.
Semimanufactures kilograms	423	(3)	--	NA.
Titanium:				
Ore and concentrate	3,290	3,270	--	Netherlands 2,670; West Germany 600.
Oxides	667	1,722	--	Spain 1,524; West Germany 195.
Metal including alloys, all forms	13	10	--	All from West Germany.
Tungsten:				
Oxides and hydroxides	NA	20	--	All from France.
Metal including alloys, all forms	38	40	(2)	West Germany 35; Japan 3.
Zinc:				
Ore and concentrate	34,059	52,450	8,090	Canada 14,042; Peru 12,800;[9] Yugoslavia 5,518.
Oxides	--	(2)	--	All from Greece.
Metal including alloys:				
Unwrought	203	NA		
Semimanufactures	300	2	--	All from Belgium-Luxembourg.
Zirconium: Ore and concentrate	1,829	1,261	--	All from West Germany.
Other:				
Ores and concentrates	(10)	14	--	All from Canada.
Oxides and hydroxides	79	41	--	West Germany 22; Switzerland 6; Japan 5.
Ashes and residues	33,341	NA		
Pyrophoric alloys	NA	5	--	All from West Germany.
Base metals including alloys, all forms	58	34	--	West Germany 14; United Kingdom 10; Austria 8.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	41	2	--	France 1; West Germany 1.
Artificial: Corundum	2,351	1,737	--	Yugoslavia 1,150; Italy 531.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$266	$94	--	All from United Kingdom.
Grinding and polishing wheels and stones[11]	483	2,326	--	Yugoslavia 1,228; Austria 403; Italy 397.
Asbestos, crude	449	NA		
Boron materials:				
Crude natural borates	6,560	NA		
Oxides and acids	100	1,646	--	Spain 1,110; Italy 534.
Cement[5]	80,600	99,500	--	U.S.S.R. 86,000.
Chalk	15	10	--	All from Switzerland.
Clays and clay products:				
Crude:				
Chamotte earth	NA	10	--	All from France.
Unspecified	1,526	177	--	West Germany 87; Italy 70.
Products:				
Nonrefractory	843	442	--	Italy 380; West Germany 55.
Refractory including nonclay brick	37,671	43,015	12	U.S.S.R. 19,739; Austria 9,011; West Germany 8,177.

See footnotes at end of table.

Table 3.—Bulgaria: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diamond: Industrial value, thousands	$6,953	$7,015	--	Belgium-Luxembourg $6,717; West Germany $192.
Diatomite and other infusorial earth	354	224	--	France 156; Iceland 68.
Feldspar, fluorspar, related materials:				
Fluorspar	NA	200	--	All from West Germany.
Unspecified	253	NA		
Fertilizer materials: Manufactured:				
Ammonia	10	4	--	All from West Germany.
Nitrogenous	--	1	--	All from Yugoslavia.
Phosphatic	241,067	500,064	196,272	U.S.S.R. 267,922; Morocco 35,870.
Potassic, K_2O content[5]	87,100	118,000	--	Mainly from U.S.S.R.
Unspecified and mixed	48	145	--	West Germany 126; France 15.
Graphite, natural	95	240	--	Austria 210; West Germany 30.
Gypsum and plaster	--	19	--	West Germany 17.
Halogens: Unspecified	1	5	--	Switzerland 3.
Lime	61	60	--	Yugoslavia 40; West Germany 20.
Magnesium compounds:				
Oxides and hydroxides	NA	169	--	France 167.
Other	20,241	17,049	--	Czechoslovakia 17,000; Yugoslavia 48.
Mica:				
Crude including splittings and waste	18	20	--	All from West Germany.
Worked including agglomerated splittings	28	5	--	West Germany 4.
Phosphates, crude[3]	1,215	1,610	--	U.S.S.R. 914; Morocco 211; Tunisia 80.
Pigments, mineral: Iron oxides and hydroxides, processed	529	222	--	West Germany 218.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$56	$1	--	All from Switzerland.
Synthetic do	$56	$47	--	West Germany $34; Switzerland $12.
Pyrite, unroasted	289,675	295,586	--	U.S.S.R. 271,000; Norway 12,315; Yugoslavia 12,271.
Salt and brine	44,404	42,965	--	Tunisia 20,850; Egypt 12,800; Netherlands 5,421.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	60	740	--	Belgium-Luxembourg 440; Spain 180.
Sodium carbonate, natural and manufactured	1	--		
Sodium hydroxide	4,139	[12]2,703	([12])	Italy 2,168; West Germany 535.
Sodium sulfate, natural and manufactured	NA	2,704	--	Finland 2,224; West Germany 480.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,854	NA		
Worked	77	1,641	--	Italy 1,353; Yugoslavia 288.
Dolomite, chiefly refractory-grade	2	--		
Gravel and crushed rock	342	356	--	All from Yugoslavia.
Quartz and quartzite	458	991	--	All from Sweden.
Sand other than metal-bearing	420	113	--	Yugoslavia 107.
Sulfur:				
Elemental:				
Crude including native and by-product	59,000	76,887	13,887	Poland 60,000; Yugoslavia 2,010.
Colloidal, precipitated, sublimed	9	NA		
Sulfuric acid	49	2,424	215	Greece 2,200.
Talc, steatite, soapstone, pyrophyllite	80	293	--	West Germany 146; Finland 80; Italy 47.
Other:				
Crude	1,718	859	--	Greece 820; West Germany 35.
Oxides and hydroxides of barium, magnesium, strontium	153	162	--	France 160.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	([2])	--	All from Italy.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	11	NA		
Carbon: Carbon black[3]	32,253	29,377	--	U.S.S.R. 28,066; East Germany 400.
Coal: Anthracite and bituminous[5] thousand tons	6,711	7,051	--	U.S.S.R 5,090; Poland 118.
Coke and semicoke[3] do	446	407	--	U.S.S.R. 311; Poland 37; Czechoslovakia 22.

See footnotes at end of table.

Table 3.—Bulgaria: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Gas, natural ____ million cubic feet	[13]202,555	NA		
Hydrogen, helium, rare gases	18	7	--	All from France.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	[13]95,550	NA	--	
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	23	23	--	All from Switzerland.
Gasoline ____ do ____	3,332	18,488	--	West Germany 16,932; Austria 1,352.
Mineral jelly and wax ____ do ____	2,180	1,236	--	West Germany 653; United Kingdom 567.
Kerosine and jet fuel ____ do ____	9,106	13,392	--	Hungary 12,222; West Germany 78.
Distillate fuel oil ____ do ____	8,825	1,171	--	Yugoslavia 895; West Germany 119.
Lubricants ____ do ____	36,827	35,504	--	Greece 6,461; West Germany 5,502; Yugoslavia 5,362.
Residual fuel oil ____ do ____	999	165,554	--	Spain 161,558; Greece 2,997.
Bitumen and other residues do ____	30,282	4,290	--	Hungary 4,242.
Bituminous mixtures ____ do ____	--	327	--	United Kingdom 170; West Germany 157.
Tars and other crude chemicals derived from coal, gas, and petroleum ____	7,427	7,077	--	U.S.S.R. 6,408; West Germany 669.

[p]Preliminary. NA Not available.

[1]Owing to lack of official trade data published by Bulgaria, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information, data published by the partner trade countries, and partial trade statistics of Bulgaria.

[2]Less than 1/2 unit.

[3]Official Trade Statistics of Bulgaria.

[4]Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[5]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

[6]U.S. export for 1981 was valued at $44,000.

[7]Excludes exports from Norway valued at $749,000 in 1980 and $486,000 in 1981.

[8]Total imports for 1981 was $12,000.

[9]Lead and Zinc statistics, monthly bulletin of the International Lead and Zinc Study Group, London, United Kingdom.

[10]Value of unspecified ores and concentrates for 1980, exported from Austria, was $513,000.

[11]Excludes exports valued at $38,000 in 1980 and $126,000 in 1981.

[12]Excludes exports from United States valued at $26,000.

[13]1980 Yearbook of World Energy Statistics, United Nations, New York.

COMMODITY REVIEW

METALS

Copper.—Copper ore was produced mainly at the Medet, Elatsite, and Tsar Asen opencast mines located in the central part of the Srednogorie Mountains, east of Sofia, and about 10% was produced in the Burgas and Panagyurishte underground mines. In 1982, the Elatsite ore-flotation complex was commissioned. Renovation of underground mines in Burgas and Panagyurishte continued, as did development of the Assarel mining complex. The Medet Mine had a capacity of 8 million tons of ore per year, and the local smelter produced approximately 20,000 tons of fire-refined copper. The mine had reserves of approximately 200 million tons of ore grading 0.4% copper. Bulgaria's copper mining capacity was 50,000 to 60,000 tons per year of metal in 1982 and, according to the planned target, was being expanded to 120,000 tons per year by the mid-1980's. The Medet porphyry copper deposits were of the copper-molybdenum type, with a copper-to-molybdenum ratio grading from 60:1 at the center to 30:1 at the boundary of the ore body. The Elatsite copper deposits also represented porphyry-copper mineralization. The ore from the Panagyurishte underground mines was obtained from massive copper pyrite ore bodies; the main minerals were pyrite, quartz, chalcopyrite, and bornite.

Iron and Steel.—The Kremikovtsi steel plant continued under reconstruction and expansion, with the assistance of the Soviet

Union, to produce 3 million tons of rolled metals per year. Kremikovtsi produced over 80 types of steel and ferrous alloys and over 1,200 different shapes of rolled metal. It met about 80% of the domestic demand, and 30% of its output was allocated for export. The Lenin iron and steel plant at Pernik was also under reconstruction to manufacture up to 1.5 million tons of steel and 1 million tons of rolled stock per year. In May and June two electric furnaces, with total annual capacity of 500,000 tons of steel were put into operation. Work started on the foundation for a 300-millimeter light section mill at Debelt, near Burgas, where a third integrated steel plant was planned. The 800,000-ton-per-year computer-controlled mill, scheduled to start up in 1985, was supplied from the German Democratic Republic. The first stage of the project will include a 750,000-ton-per-year direct-reduction plant, a 900,000-ton-per-year electric melting shop, and a 4-meter plate mill.

The plant, at Septemvri for production of wide-diameter steel pipes for oil and gas, started to produce spirally welded pipes and was to start producing seamless pipes in the near future.

Dravo Engineering Inc. of the United States was negotiating a contract to sell direct-reduction technology (HYL process) for the Burgas metallurgical complex.

Lead and Zinc.—Lead-zinc ores in Bulgaria continued to be mined by underground methods at a depth of more than 400 meters, mainly in the mines of the Gorubso enterprises in the Rhodope Basin; the main mines were located in Madan, Rudozem, Ermorechensk, Likinsk, Madjarovo, and Ustrem. There also was mining in Sedmochislenici in the Stara Planina Mountains. Most Bulgarian ore deposits are of the vein type with small thickness and low metal content. The main ore minerals are galena and sphalerite, which are always accompanied by pyrite, chalcopyrite, arsenopyrite, and marcasite. The complicated structure of the deposits limited the method of exploitation and caused low productivity. In all the Gorubso Mines, except Sedmochislenici, productivity was approximately 4.29 cubic meters per miner per shift and 1.20 cubic meters per underground worker per shift. In the Sedmochislenici Mine the ore body was massive, and productivity was much higher, reaching 6.2 to 7.4 cubic meters of ore per miner per shift and 2.19 to 2.35 cubic meters per underground worker per shift. The cost of production was L9 to L13 per cubic meter, or one-third to one-half the cost of mining the vein deposits. Exploration continued in Ermorechensk, where lead-zinc deposits with high metal content were located at a depth of 700 to 800 meters. The main problem was drainage of hot underground water. Construction of the new mines and concentrating plant in Osogovo, which started in 1980, continued in 1982.

Lead concentrate (65% lead) and zinc concentrate (50% zinc) were processed mainly at the Plovdiv and Kurdjali smelters. Kurdjali, in the eastern Rhodope Basin, is Bulgaria's oldest lead and zinc smelter; it was built with aid from the Soviet Union. It treats complex local ores and has a capacity of 45,000 tons per year of lead and 30,000 tons per year of zinc. Production also includes cadmium, bismuth, and other byproduct metals. Plovdiv is located 150 kilometers southeast of Sofia and processes local lead-zinc ores. Capacity is about 55,000 tons per year of lead and 60,000 tons per year of electrolytic zinc. It also produces cadmium and other byproduct metals.

NONMETALS

Feldspar.—The widespread Bulgarian quartz-feldspar sands were a relatively new prospect for production of feldspar. The main minerals in these sands were quartz, 62%; feldspar, 20%; and clay minerals, 16%; other minerals, such as muscovite, biotite, and tourmaline, were about 2%. Processing of these raw materials by flotation and electrostatic separation yielded a high-grade feldspar concentrate with 13% to 14% $K_2O + Na_2O$, 0.16% to 0.20% Fe_2O_3, 0.03% to 0.08% TiO_2, and a K_2O:Na_2O ratio of 15:1 to 20:1. Sand reserves were estimated at 30 to 40 million tons. In the near future it was planned to build a new processing facility to produce about 50,000 to 60,000 tons per year of potassium feldspar. Feldspar was also produced from pegmatites with a feldspar content of about 65% to 70% and a K_2O:Na_2O ratio of 1:1. Processing of the pegmatites by flotation yielded a feldspar concentrate of 11% to 12% $K_2O + Na_2O$ and 0.16% to 0.18% Fe_2O_3 with a K_2O:Na_2O ratio of 2:1 to 3:1.

Gypsum.—Gypsum reserves were estimated at several hundred million tons,

located in scattered regions of the country. The most important were located at Slanotren and Koshava, 19 kilometers northwest of Vidin in western Bulgaria and at Rodnevo and Gipsovo near Stara Zagora. The gypsum beds, which contained small amounts of carbonates, clay minerals, quartz, and feldspar, occur in western Bulgaria at depths of 225 to 305 meters. The gypsum is mostly white and comprises about 80% to 90% of the raw material. Recovery in the mine was only 15% to 20%. In order to increase this recovery, a new system of hydraulic backfilling for underground mining was developed, which was expected to increase recovery 40% to 50%. About 80% of the raw gypsum was used in the cement industry, and most of the remainder was used for the production of roasted gypsum and gypsum manufactures.

MINERAL FUELS

Coal.—Coal production rose by 2.9 million tons to a total of 32.2 million tons; lignite accounted for most of the increase.

Bulgaria had about 4.4 billion tons of proven lignite reserves, of which 3.7 billion tons were economically recoverable. The largest reserves of lignite were found at the East Maritsa lignite basin, located near the town of Zagora. This basin had over 2.9 billion tons of reserves and accounted for about 64% of total coal production. New deposits of lignite were surveyed at Lom, in the northwest, at Elkhovo in the southeast, and near Sofia. Expected reserves of lignite in these regions were as follows: at Lom 1.2 billion tons, at Elhovo 430 million tons, and near Sofia 800 million tons. Reconstruction, renovation, and amalgamation of existing mines such as Zdravets, Black-Sea 2, the Troyanovo opencast mine, and others continued in 1982, and equipment for them was delivered from the U.S.S.R., the German Democratic Republic, and Romania. Reserves of brown coal were located mainly in the western and southwestern part of the country in the Bobov Dol, Pernic, and Pirin Basins and were estimated at about 327 million tons. Brown coal production accounted for about 17% of total coal production. Hard coking coal reserves were found in the Balkan Coalfield situated in the eastern part of the Balkan Mountains. Coking coal reserves were estimated at 140 million tons. Reserves of bituminous coal in the recently discovered Dobrudja Basin in the northeastern part of Bulgaria were estimated at over 1.5 billion tons. In 1982, drilling at the site of the new mines in Dobrudja reached a depth of 1,250 meters. The seams of high-quality bituminous coal were expected to be at a depth of 1,300 to 1,800 meters. The thickness of the coal seams was estimated to be 1.5 to 2.5 meters. The coal had a calorific value of up to 7,000 kilocalories per kilogram, with good coking qualities and low ash and sulfur content.

The share of solid fuel in the total energy balance will remain steady, but the share of locally produced coal will increase from 18% in 1980 to 22% in 2000. Despite this planned steady rise in output, Bulgaria's coal requirements will not be met from domestic sources alone, and bituminous coal and coke will have to be imported. In 1982 5.5 million tons of bituminous coal and 483,000 tons of coke were imported from the U.S.S.R.

Natural Gas.—Bulgaria's gas industry continued to develop. The main ring of the national grid system was under construction. New gas pipelines and compressor stations as well as an underground gas storage facility were also under construction. Some 1,000 kilometers of long-distance lines and two compressor stations were in operation. Reliance was principally on gas imports from the U.S.S.R. The domestic output, which was small, was utilized to cover the gas producing area's own requirements. About 5 billion cubic meters of gas was imported from the U.S.S.R., and this is expected to increase every year.

Petroleum.—Indigenous production of crude oil was small and came from small oilfields in the northwest part of the country. Prior to 1982 the Soviet Union supplied Bulgaria with a quantity of crude oil in excess of the country's domestic needs, allowing the surplus to be reexported as refined products, or even as crude. However, according to the Director of "Chimprom," Bulgaria was among the East European countries that had their supplies of Soviet petroleum cut 10%. Supplies of oil from Organization of Petroleum Exporting Countries (OPEC) reportedly amounted to about 30 million barrels. The developing petroleum and petrochemical industry was based on the Pleven and Burgas oil refineries, with total capacity of 107 million barrels of crude oil per year. In mid-1982, at the Burgas petrochemical enterprise, a catalytic cracking complex for refining 15 million barrels of fuel oil per year, which included installations for vacuum fuel oil distillation, viscosity breaking of road tar,

hydrogen production, and hydrocleaning of cracking raw material, was brought into operation. This complex increased production of light petroleum products from refined oil by 80%.

Two Soviet research vessels arrived at Varna to take part in a joint expedition for surveying Bulgarian offshore waters.

[1]Foreign mineral specialist, Division of Foreign Data.

[2]Official exchange rate for the Bulgarian lev (L) for 1982 was L0.94=US$1.00, but values were not converted because the lev is not freely convertible.

[3]Statisticheski Izvestiya (Statistical News). Sofia. No. 4, 1982, p. 7.

The Mineral Industry of Burma

By Gordon L. Kinney[1]

Burma was not a major world producer of any mineral commodity in 1982. At least 30 minerals, however, were exploited commercially during the year. Most of these were consumed domestically. The most important minerals or mineral-based commodities to the Burmese economy were crude oil, natural gas, tin, gem stones, tungsten, fertilizer, cement, lead, and silver.

Approximately 71,000 persons were employed in the mining industry at the beginning of 1982. Only 2,000 were employed by the private or joint private-government sector; the remaining 69,000 were employed in state-owned mining operations. Mining personnel were 0.5% of the country's active labor force. They accounted for 2.2% of the net output of goods and services, contributing to one of the most efficient sectors of the economy.[2]

The main objectives set by the Government for the mining sector during the third 4-year plan, fiscal year (FY) 1977 through FY 1980,[3] were to exploit mineral resources to the optimum, extend mineral exploratory surveying, prepare to supply the primary raw materials required for establishing a mineral-based heavy industry, boost crude oil and industrial mineral production to save foreign exchange, and minimize losses and waste. The production of crude oil was given top priority.

The public investment in the mining sector increased annually during the third 4-year plan from $45 million in the base year to $129 million in the final year.[4] The aggregate investment for the third 4-year plan was $415 million, more than double the planned amount, and constituted 12.4% of the public investment during the period. The planned public investment in the mining sector for FY 1982 was $137 million or 11.5% of total investment. Only the processing-manufacturing sector surpassed that percentage in the Government's plan.

Between FY 1975 and FY 1981, Burma's economy grew at an average annual rate of 7%, after over a decade of economic stagnation. Changes in Government policies since 1975 have been instrumental in that growth.

Prior to the mid-1970's, Burma had an isolationist policy with emphasis on import-substituting industrial development, with tight Government control of the marketplace. By the mid-1970's, the Government realized the necessity for increasing international trade, loosening market controls, and increasing agricultural production.

The acceptance of foreign loan capital and expertise promoted growth. From 1977 through 1981, foreign lenders committed over $2 billion to Burma. These loans financed projects that modernized existing capital stock, developed basic infrastructure, and added new industries.

Economic growth has slackened considerably from the recent trend. Gross domestic product (GDP) for FY 1981 was about $5.9 billion, about the same as that of FY 1980.[5] The real increase in GPD for FY 1982 reportedly will be lower than the Government's target of 6%, probably less than 5%.

The turnaround was attributed in part to a substantial drop in export earnings and to a rapidly worsening domestic energy shortage. The 1982 production of domestic crude oil was significantly lower than the target of 16.5 million barrels. The decline, coming at a time of increasing domestic demand, prevented Burma from fulfilling a 1-million-barrel commitment to Japan. Construction of roads and other development projects has been adversely affected because of diesel oil shortages.

The Government's policy for the past several years has been to refrain from importing crude oil mainly because of the drain on foreign exchange reserves. It appears that domestic production cannot meet the country's needs and therefore some imports will be necessary.

PRODUCTION

The performance of the mining sector continued to be satisfactory during FY 1981. The $122 million output of the mining industry increased for the sixth consecutive year.[6] In FY 1981, the mining sector accomplished 83.5% of the Government's planned production goal. While not meeting the goal, the increase in production value still showed a growth rate of 15.8% over the FY 1980 figure and an average growth rate for the third 4-year plan of 8.2% per year. The increase in product value for the mining sector for FY 1982 at constant 1969 prices was set at 13.1%.[7]

The most important mineral in aggregate value was crude oil by far. Also important, but much lower in value, were gem minerals, tin, lead, silver, cement, and natural gas. In the near future, copper concentrate from the Monywa project is expected to take on a prominent position in the value listings and, according to Government plans, refined tin metal was to be produced for the first time in 1982.[8]

The FY 1981 statistics for natural gas, tin, lead, silver, zinc, barite, graphite, feldspar, coal, and limestone showed significant production increases over those of FY 1980. These statistics show the trend of increased mineral output. Crude oil showed an unrealistically high increase for the period reflecting abnormally high water content of the oil resulting from previous overpumping of the wells. The water content at the wellhead was more than 20% of the gross volume.

Table 1.—Burma: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Antimony, mine output:					
Gross weight	1,477	1,690	1,094	875	--
Sb content[e]	590	680	440	350	--
Copper:					
Mine output, metal content	56	67	56	77	101
Matte, gross weight	125	148	123	170	223
Iron and steel: Crude steel[e]	40,000	--	--	2,794	13,542
Lead:					
Mine output, metal content[e]	9,900	r15,000	14,200	16,100	16,050
Metal:					
Refined including secondary	4,975	6,237	6,014	4,068	7,829
Antimonial lead (18% to 20% Sb)	127	185	185	254	279
Nickel:					
Mine output, metal content[e]	18	18	14	20	20
Speiss, gross weight	70	67	57	80	81
Silver, mine output thousand troy ounces	377	340	587	450	526
Tin, mine output, metal content:					
Of tin concentrate	346	573	540	596	804
Of tin-tungsten concentrate	411	660	750	842	877
Total	757	1,233	1,290	1,438	1,681
Tungsten, mine output, metal content:					
Of tungsten concentrate	189	276	305	248	243
Of tin-tungsten concentrate	282	416	518	577	601
Total	471	692	823	825	844
Zinc, mine output, metal content	2,645	3,028	4,079	3,556	5,382
NONMETALS					
Barite[3]	35,320	39,486	4,819	e10,200	19,915
Cement, hydraulic	254,000	390,606	386,159	317,434	344,225
Clays:[3]					
Ball clay	4,573	4,294	4,390	793	409
Bentonite	1,377	1,446	1,347	2,317	1,463
Fire clay[4]	4,878	4,413	3,711	1,755	1,633
Industrial white clay	2,000	6,876	4,626	813	813
Feldspar[3]	2,000	2,004	1,689	4,267	2,540
Graphite[3]	280	268	199	1,422	279

See footnotes at end of table.

Table 1.—Burma: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Gypsum[3]	35,431	38,265	37,132	31,095	26,079
Pigments, mineral, natural: Iron oxide	461	369	330	350	350
Precious and semiprecious stones: Jadeite[3] kilograms	12,454	7,707	7,953	8,891	9,682
Salt thousand tons	304	258	268	270	280
Stone:[3]					
Dolomite	1,616	1,882	2,450	6,381	3,250
Limestone, crushed and broken thousand tons	1,437	1,259	1,151	1,219	1,221
Quartz	--	122	143	37	39
Talc and related materials: Soapstone[3]	391	394	333	128	128
MINERAL FUELS AND RELATED MATERIALS					
Coal (lignite)	33,113	36,064	26,919	38,100	38,200
Gas, natural:					
Gross[3] million cubic feet	17,000	18,000	24,000	28,000	28,000
Marketed[3] do.	9,892	12,030	14,837	23,000	24,640
Petroleum:					
Crude (gross wellhead) thousand 42-gallon barrels	9,995	10,822	10,110	10,447	10,549
Refinery products:[5]					
Gasoline do.	1,864	2,008	e2,080	e2,060	2,000
Jet fuel do.	e280	e300	e300	e300	300
Kerosine do.	744	548	e450	e570	500
Distillate fuel oil do.	2,500	2,626	e2,570	e2,770	2,400
Residual fuel oil do.	1,532	1,396	e1,540	e1,610	1,500
Lubricants do.	140	e140	e140	e140	100
Other do.	e223	e220	e220	e220	200
Total do.	7,283	7,238	e7,300	e7,670	7,000

eEstimated. pPreliminary. rRevised.

[1]Table includes data available through June 17, 1983.

[2]In addition to the commodities listed, pottery clay, common sand, glass sand, other varieties of crude construction stone, and other varieties of gem stones are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Data are for fiscal years beginning Apr. 1 of that stated.

[4]Includes fire clay powder.

[5]Data exclude products used as fuel in refineries.

TRADE

Burma's exports of minerals reflected the worldwide downturn in the mineral commodities market. Export earnings for FY 1982 were $30 million campared with $46 million in FY 1981. Export volume increased for refined lead only, while export earnings from lead dropped from $6.6 million to $3.1 million. Other mineral exports declined in value as well as quantity.[9]

COMMODITY REVIEW

METALS

Copper.—Production of copper concentrate started during 1982 at the Yugoslavian financed Monywa plant that has a designed output of 60,000 tons of 18% copper concentrate per year. Production figures were not released by the Burmese Government's No. 1 Mining Corp., which is the owner and operator of the plant.

At yearend 1982, Burmese officials were considering the development of the nearby Letpadaung ore body. This deposit contains 190 million tons of ore and the planned production is 140,000 tons of concentrate per year. Burmese authorities would like to construct a copper smelter, but domestic financing was questionable because of the depressed world copper market. Alternate sources of capital were not available because of Burma's reluctance to accept foreign equity.[10]

Gold.—A Government official stated that Burma began small-scale manual mining of gold at a number of locations where it appeared to be commercially exploitable. Gold exploration was continuing simultaneously at the mining sites.[11]

Lead, Zinc, and Silver.—Bawdwin Mine was the sole source of lead, zinc, and silver

in 1982. The large production increase shown in table 1 was the result of the refurbishing and expansion project conducted during the last few years. Further expansion of the mine was proceeding with aid from the Federal Republic of Germany. No. 1 Mining Corp. completed procurement of additional equipment and materials to start an open pit operation at Bawdwin.

Since the mine opened in 1905, it has had some of the richest lead-zinc-silver ore in the world. As the grade slowly declined through the decades, a plan was made to convert from underground to open pit mining. The lack of financing and local security problems delayed implementing the plan on several occasions. The increased production of lower grade ore from an open pit would also require expanding the ore dressing plant, rebuilt just 2 years ago. The FY 1986 goals for the Bawdwin operation are 390,000 tons of ore, 7,500 tons of refined lead, 10,500 tons of zinc concentrate, 656,000 ounces of silver, and production of several byproduct minerals.

Tin and Tungsten.—The Government was in the midst of an ambitious program to increase output of tin and tungsten. Several projects were under construction or recently completed and undergoing trial operations.

The No. 2 Mining Corp. completed a test run of the expanded Heinda fossil placer tin mine and mill. Full-scale production at the facility was to begin at 1,000 tons of tin concentrate per year.[12]

Production reportedly started at the Kazat gravel pump operation after a startup period of testing in 1981. Also, the refurbished Tavoy concentration plant apparently began production of tin, wolframite, and scheelite concentrates after a break in test period in 1981.

The new 0.34-cubic-meter-bucket ladder dredge, Heinze, was believed to be operating in the drowned tidal valley of the Heinze River during 1982. This area was an important source of dredged tin ore prior to World War II. The new dredge has an hourly capacity of 378 cubic meters or 1.5 to 2.0 million cubic meters per year. The dredge's output was expected to be about 600 tons of tin-in-concentrate per year.

Late in 1982, the Asian Development Bank approved a $16 million interest-free loan to help rehabilitate Burma's tin industry. The money will finance the foreign exchange component of a group of mining operations in southern Burma. Facilities will be established for mining the alluvial tin deposits in the Tenasserim Div. along the Andaman Sea coastline. Gravel pump mining operations will be started by No. 2 Mining at the following sites: Ahtwin Bokypin, Zadiwin, Kyaukmedaung-Onzin Chaung, Shanthe, and Thithladaw.

In addition, the loan will help pay for a foundry for gravel pump replacement parts, a central ore concentration plant, a central maintenance workshop (at Mergui), detailed deposit delineation, and training for management and technical personnel.

The Government reported that construction of the 1,000-ton-per-year tin smelter at Syriam, near Rangoon, was completed. The FY 1982 Government plan called for production of 750 tons of tin metal. This was the first report of tin metal production by the Government. The tin smelter was built with North Korean technical assistance and financed by a barter arrangement. The Government was reportedly considering having the North Koreans double the smelter capacity.

NONMETALS

Cement Raw Materials.—Clay, limestone, and gypsum production were scheduled to be increased to supply new cement plants either under construction or planned.

Approximately 30% of the new cement plant at Pa-an was completed. The dry-process plant was to have an 840-ton-per-day capacity and be completed in 1983.

Engineering survey work on a 1,400-ton-per-day wet-process plant was completed in FY 1981 at the old Kyangin cement mill. The planned completion date was also in 1983. A second, similarly sized plant was also planned. It was not clear whether the old mill would continue to be operated, refurbished, or scrapped.

Fertilizer Materials.—Much of Burma's natural gas was used to produce ammonia and urea fertilizer at Pagan and Sale. The plant at Sale was being expanded with the help of a loan from Austria. The plant, scheduled for completion in 1982, was to have a new capacity of 83,000 tons of urea fertilizer per year. Construction of the long planned No. 3 fertilizer plant near Prome, financed by a loan from the Federal Republic of Germany, started in FY 1981. The capacity was reported to be 91,000 tons per year of nitrogen content. The plant was to begin production in late 1984. Completion of these projects was expected to make Burma self-sufficient in nitrogenous fertilizer for several years.

Gem Stones.—Burma has historically been an important producer of fine quality gem stones and jade. Rubies and sapphires come mainly from the Mogok area, about

100 kilometers north-northeast of Mandalay. Jade occurs in the northern State of Kachin. Kamaing, in the same State, is the world's only source of the semitransparent, emerald green variety of jadeite known as Imperial Jade. Spinels and amber are also found in northern Burma.[13]

The Government's annual report showed that the gross sales proceeds from the annual gem and pearl emporium have increased each year but one since 1975.

Burma's 20th annual gem emporium held at the end of FY 1982 had sales of $8.6 million worth of jade, gems, and pearls, the largest sale to date. Over 200 gem merchants from 12 countries attended the emporium. The bidding for jade accounted for nearly 59% of the sales. A 33-ton boulder of raw jade, found last year, was displayed but not offered for sale. Sales of ruby, sapphire, and other precious stones brought $375,000, down nearly $200,000 from those of FY 1981. It was reported that a considerable proportion of Burma's gem stones are black marketed into Thailand. The Government may also retain gems as a form of hard currency.[14]

Other Nonmetals.—Production was started at a new sheet glass plant at Bassein, and a bottle glass plant expansion at the Syriam glass factory and a household glasswares plant were completed in FY 1981.

Feldspar and several types of clay minerals were mined for domestic consumption in the ceramics industry. In addition, a sizable amount of crude clay, probably exceeding 90,000 tons per year, was mined for use in local brick kilns.

MINERAL FUELS

Coal.—Coal has never been produced in large tonnages in Burma. There are, however, coal deposits near Kalewa in the Chin Hills and in the vicinity of the Bawdwin complex in northern Shan State. Most of the coal is produced at the Kalewa underground mine. The Ministry of Mines was reportedly striving to increase utilization of coal from these deposits in order to save $10 million in foreign exchange currently spent on coal imports each year, mostly from India and China.

Preliminary Government figures confirm a sizable production increase in the last 2 years. The Government's FY 1982 plan called for production of 44,000 tons. Also, as part of the expansion program, tenders were offered for coal briquetting plants to feed thermal powerplants and coal-fired steam railroad locomotives. The direct-reduction steel plants could also use a significant amount of domestic coal if available.

Petroleum and Natural Gas.—Burma's crude oil production continued to level off at a time when domestic demand for diesel and other petroleum fuels was being stimulated by the growth of the Burmese economy. Shortages in refined products, resulting from the crude oil shortfall, have delayed work on some important development projects.

Reliable current production statistics were not available. The Government's preliminary FY 1981 estimate of 12 million barrels was later revised to 10.4 million barrels; a non-Government estimate was 9.7 million barrels. The Government's production target for FY 1982 was 16.5 million barrels, which appears to be overly optimistic.

Hopes for greatly increased crude oil production were raised in November 1981 when the Prime Minister announced the discovery of three major oilfields. It now appears that the reports were optimistic. The Kyontani Oilfield in the Irrawaddy Delta has good potential but development is difficult because of flooding during the monsoon season between June and November. No oil has been produced from the three wells drilled thus far. Four wells have been completed at the second field located at Tuyintaung, 8 kilometers southeast of Pagan. The Government-owned Myanma Oil Corp. (MOC) reportedly struck oil in the first well. Despite enthusiastic reports, the well produced crude so thick it could not be economically recovered. To find better crude, MOC was drilling several kilometers both south and north of Pagan. The third field, the only successful one to date, is located at Tantabin, near Kyangin. It has the possibility of becoming mainly a natural gasfield. Production in early 1982 was 600 barrels of condensate and 6.7 million cubic feet of gas per day. By yearend 1982, 22 wells had been sunk at Tantabin and development drilling continued.

The production of natural gas has been satisfactory. According to a National Assembly report,[15] natural gas output has risen from 8.5 billion cubic feet in FY 1976 to 14.8 billion cubic feet in FY 1980. A substantial increase in gas was expected in FY 1981 from the new Tantabin Field and from increased utilization of previously flared gas in new gas-turbine-powered gen-

erators at Prome and other installations.

In February 1982, the Tokyo-based Burma Petroleum Development Co. (BPDC) signed a $17 million agreement with MOC for funding two exploration wells in the Gulf of Martaban. BPDC is a joint venture headed by Idemitsu Oil Development Co., Japan National Oil Corp., and 11 Japanese trading houses.

BPDC began drilling in November after the monsoon season. The plan was to drill in exploration blocks previously leased by Esso and Martaban-City Service. However, the initial well was spudded in shallow water off the Irrawaddy Delta in blocks MOC had reserved for itself, which had not been leased previously to a foreign concession holder. A well was drilled to 2,076 meters where natural gas was struck in a Miocene limestone formation. A production test yielded a flow rate equivalent to 39 million cubic feet per day. This was the first gas found offshore Burma in a limestone reservoir. Although encouraging, the discovery did not solve Burma's petroleum shortage. With Burma already producing onshore natural gas sufficient to satisfy domestic needs, the development of the offshore field, which would require a large capital investment, was unlikely. The search for offshore oil, however, was continuing.

MOC was expected to announce new production sharing contracts in early 1983 to enhance foreign participation offshore. The contract terms were said to be favorable. The Government was not expected to release geological or geophysical data on the exploration blocks until a contract is signed.[16]

Mitsubishi Heavy Industries Corp. of Japan completed construction of a 25,000-barrel-per-day oil refinery at Mann and handed it over to Petrochemical Industries Corp. (PIC). As of July 1982, Mitsubishi had not tested the equipment because of the crude oil shortage.

With the Mann refinery, PIC's capacity was 57,000 barrels per day. At yearend 1982, PIC was operating at less than 50% capacity.

Despite PIC's surplus refining capacity, the crude production shortfall, and growing demand for petroleum products for Burma's economic development, Burma has not imported crude oil since 1974. The Government policy has been to remain independent of crude oil imports. No change in this policy has been indicated.[17]

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[1]Physical scientist, Division of Foreign Data.

[2]Ministry of Planning and Finance. Report to the Pyithu Hluttaw on the Economic and Social Conditions of the Socialist Republic of the Union of Burma for 1982-83. 1982, pp. 18, 25.

[3]The Burmese fiscal year begins Apr. 1 of the year stated.

[4]Values have been converted from Burmese kyats (K) to U.S. dollars at the average rate of FY 1977-78, K6.787=US$1.00; FY 1978-79, K7.184=US$1.00; FY 1979-80, K6.57=US$1.00; FY 1980-81, K6.62=US$1.00; and FY 1981-82, K7.30=US$1.00.

[5]U.S. Embassy, Rangoon, Burma. Economic Trends Report for Burma. Department of State Airgram A-15, Mar. 6, 1983, p. 2.

[6]Page 25 of work cited in footnote 2.

[7]Page 327 of work cited in footnote 2.

[8]Page 343 of work cited in footnote 2.

[9]U.S. Embassy, Rangoon, Burma. Industrial Outlook Report—Minerals. Department of State Airgram A-2, Mar. 10, 1983, p. 5.

[10]Page 3 of work cited in footnote 9.

[11]Summary of World Broadcasts—FE/W1212/A/18, Nov. 24, 1982. Tanjug (radio) in English 1724 GMT, Nov. 11, 1982.

[12]Page 229 of work cited in footnote 2.

[13]World Mining. V. 35, No. 5, May 1982, p. 53.

[14]U.S. Embassy, Rangoon, Burma. Department of State Telegram 01165, dated R181022Z, March 1983, p. 1.

[15]Page 134 of work cited in footnote 2.

[16]Petroleum News. V. 13, No. 10, January 1983, p. 9.

[17]U.S. Embassy, Rangoon, Burma. Petroleum Outlook Report—Burma. Department of State Airgram A-26, July 8, 1982, pp. 1-7.

The Mineral Industry of Canada[1]

By Harold R. Newman[2]

In 1982, the Canadian economy was characterized by a decline of the gross national product (GNP) of approximately 4% and a corresponding decline in the gross domestic product of nearly 7%. Unemployment increased sharply and, although there was regional variation, was expected to remain above 10% into 1983. The number of unemployed miners in Canada was estimated at 55,000, and mining communities across Canada were seriously affected. Canada ranked seventh in the world in GNP and was one of the world's largest producers of a wide variety of minerals. The mineral industry has been a major force in Canada's economic development. The combination of weak demand, falling commodity prices, and high interest rates during the current recession has had a severe impact on the Canadian mineral industry. Canada ranked first in the world in mineral exports and third in mineral production, behind the United States and the Soviet Union. Canada was the world's largest producer of asbestos, zinc, silver, and nickel; the second largest producer of potash, gypsum, molybdenum, and sulfur; and a leading producer of uranium, titanium, aluminum, cobalt, gold, lead, copper, iron, and platinum. Mineral deposits are located in all regions of Canada. Therefore, the effect of reduced demand and lower prices for almost all the mineral commodities was felt across all of Canada. Production cutbacks, temporary mine closures, extended mine closures, and, in some instances, permanent closures occurred as the mineral sector sought ways to minimize its losses.

The year was a critical period for the Canadian mining industry, and some companies posted record losses. The associated mineral products industries also encountered similar economic difficulties. Companies reduced capital spending plans, postponed new developments, and reduced expenditures for exploration in attempts to cut costs. Nevertheless, despite a bad year, minerals are essential industrial commodities and will continue to be needed in large quantities, so that the longer term outlook is favorable. Wealthier than most in terms of natural resources, Canada's mining industry's economic condition was expected to improve when increased economic activity occurs in the Western industrialized countries. The United States was the principal customer for Canadian mineral products; therefore, economic recovery in the United States was necessary before a significant upturn occurred in Canada.

Government Policies and Programs.—In 1980, Canada announced a comprehensive National Energy Program (NEP). This program was designed in part to decrease foreign control of the domestic oil industry by allowing a greater degree of Canadian ownership in the energy sector. In addition, the NEP's goal was also to achieve Canadian self-sufficiency in energy, including oil. NEP covers a broad range of issues including price, taxation, ownership, investment, exploration, and development.

In 1982, the Canadian energy sector was in a state of flux, and continual adjustments took place to reflect the situation facing the industry. Domestic energy policies were changing because of poorer economic performance than expected and the peaking and decline of international oil prices. The Alberta government, in April, initiated several changes in the Province's oil and gas royalty structure in an effort to stimulate its energy sector. The Federal Government also took a series of actions to increase the

cash flow of the energy sector: (1) the adjustment of the range of oil and gas eligible for higher output prices, (2) the reduction of the rate of the Petroleum and Gas Resources Tax for 1 year, and (3) set the Incremental Oil Revenue Tax rate at zero for 1 year. It also made other adjustments to strengthen the position of small producers and to encourage development of higher cost oil.

An important event in Canadian history occurred in 1982 when technical British authority over Canada's constitution, the amended British North American Act of 1867, was ceremonially relinquished. This patriation of the constitution occurred after the Federal and Provincial Governments, with the exception of Quebec, agreed on a Charter of Rights and an amending formula. Although the confederation was strenghthened by the constitutional change, debate over Federal-Provincial relations continues. The Western Provinces seek a greater degree of control over natural resources, especially energy resources. The Atlantic Provinces are contesting Federal claims to fishing and mineral rights off their coasts. A Canada-Nova Scotia Offshore Oil and Gas Agreement was announced in March 1982, although a dispute continues between the Province of Newfoundland and the Federal Government over the control and management of offshore mineral rights.

PRODUCTION

According to the Canadian Department of Energy, Mines and Resources, the total value of Canada's mineral production, including fuel and nonfuel minerals, reached an alltime high of $26.9 billion,[3] a slight increase of 2.5% over that of 1981. The increase in value does not reflect the economic weakness of the nonenergy minerals sector. The metal industry suffered a severe decline, dropping to a value of $5.7 billion compared with $7.1 billion in 1981. The performance of nearly all base metals, except gold, was dismal. Nonmetal output values dropped from $2.2 billion in 1981 to $1.7 billion. The value of output of mineral fuel commodities increased 17% from $15.4 billion in 1981 to $18.1 billion.

Performance of the nonfuel minerals industries experienced a pronounced slowdown. The copper market was severely depressed, and production dropped to about 60% of capacity. The decision of the Intergovernmental Council of Copper Exporting Countries to support the policy of maintaining production, in spite of falling prices, further exacerbated Canadian copper producers' problems. Most Canadian copper producers shut down operations for varying periods of time in 1982. Capital equipment or development investments were being deferred. The value of copper production dropped from $1.2 billion in 1981 to $1 billion. Some mines were closed indefinitely waiting for copper prices to increase significantly.

The world glut of iron ore reduced demand for Canadian iron ore exports. Iron ore shipments during the year were valued at $1 billion, a significant decline from the 1981 value of $1.4 billion. The industry was operating at about 50% of capacity. Nickel and molybdenum production ceased almost entirely in the latter part of 1982. The value of nickel dropped from $1 billion in 1981 to $471 million. Molybdenum value increased from $178 million in 1981 to $265 million, although marketing the commodity was difficult for producers. Refined zinc increased about 2% in value and 4% in output. Lead production increased slightly; however, the value of output dropped 20% below that of 1981. Gold value rose slightly to $754 million compared with $748 million in 1981.

Asbestos value declined 31% from $474 million in 1981 to $327 million. Compared with that of 1981, potash output was lower by 20.6% and value declined 36.8% to $508 million. The major structural materials, cement and sand and gravel, fared no better than the mining industry in general. Cement production was off by 20%, gypsum production fell 12%, and mineral aggregates were down by approximately 25%, all compared with those of 1981.

The value of mineral output increased in 5 of the 10 Provinces and both Territories. The Province of Alberta, with its large oil and gas output, accounted for approximately 61% of Canada's total mineral value. Production values of the Provinces and Territories follow:

Province or Territory	Value, billion U.S. dollars	
	1981[r]	1982[p]
Alberta	14.2	16.4
Ontario	3.4	2.6
British Columbia	2.2	2.3
Saskatchewan	1.8	1.8
Quebec	2.0	1.6
Newfoundland-Labrador	.8	.5
Northwest Territories	.4	.5
Manitoba	.5	.4
New Brunswick	.4	.4
Nova Scotia	.2	.2
Yukon Territory	.2	.2
Prince Edward Island	(1)	(1)
Total	26.1	26.9

[p]Preliminary. [r]Revised.
[1]Less than 1/2 unit.

Source: Department of Energy, Mines and Resources, Canada, Annual Report, 1982.

In 1982, more than 60 commodities were produced from mining activities conducted in every region of the country. The values of the principal mineral production follow:

Commodity	Value, million U.S. dollars	
	1981[r]	1982[p]
METALS		
Iron ore	1,418	983
Copper	1,241	957
Zinc	884	900
Gold	748	754
Uranium (U)	644	661
Nickel	1,005	471
Silver	372	308
Molybdenum	178	265
Lead	214	171
Total	6,704	5,470
NONMETALS		
Potash, K_2O equivalent	803	508
Cement	540	495
Asbestos	474	327
Salt	107	131
Lime	125	121
Clay products	97	77
Gypsum	38	35
Total	2,184	1,694
MINERAL FUELS		
Petroleum	7,671	9,435
Natural gas	5,210	5,746
Coal	870	1,053
Total	13,751	16,234

[p]Preliminary. [r]Revised.

Sources: Department of Energy, Mines and Resources, Canada, and Statistics Canada, 1982.

Table 1.—Canada: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Alumina, gross weight thousand tons	1,054	[r]824	1,202	1,208	1,127
Metal:					
Primary	1,048,469	860,256	[r]1,068,198	1,115,691	1,064,795
Secondary	74,752	[r]84,472	[r]65,147	59,281	62,000
Antimony[e 2]	3,005	2,954	2,361	[r]1,670	907
Bismuth[3]	145	139	[r]150	168	106
Cadmium[4]	[r]1,268	1,460	1,303	1,298	809
Calcium kilograms	574,674	455,713	531,000	469,403	W
Cobalt:					
Mine output, metal content[5]	1,234	1,640	[r]2,118	2,080	1,458
Metal[6]	519	[r]1,424	[r]1,018	1,277	1,041
Columbium and tantalum:					
Columbium concentrate (pyrochlore):					
Gross weight[e]	4,122	4,186	3,884	[r]4,100	4,758
Cb content	1,729	1,756	1,629	2,714	3,250
Tantalum concentrate:					
Gross weight[e]	[r]253	355	[r]550	[r]289	161
Cb content	8	9	9	7	4
Ta content	126	130	104	104	60
Copper:					
Mine output, recoverable metal content[7]	[r]659,360	636,383	716,400	619,328	606,202
Metal, primary and secondary:					
Blister and anode	425,300	[r]386,420	[r]492,710	479,046	366,625
Refined	446,278	397,263	505,238	476,655	312,411
Gold thousand troy ounces	1,735	1,644	1,552	1,673	2,008
Iron and steel:					
Iron ore:[8]					
Gross weight thousand tons	41,751	59,617	[r]49,068	49,551	34,496
Iron content do	26,228	37,681	32,045	31,712	22,000

See footnotes at end of table.

Table 1.—Canada: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS —Continued					
Iron and steel —Continued					
Metal:					
Pig iron ---- thousand tons	10,340	10,906	11,183	9,743	8,000
Ferroalloys ---- do	200	175	289	282	185
Steel, crude ---- do	14,898	16,078	15,887	14,811	11,871
Semimanufactures[9] ---- do	11,894	12,235	13,030	13,186	9,556
Lead:					
Mine output, metal content	319,809	r341,777	296,641	332,045	341,212
Metal, refined:					
Primary	194,054	183,769	162,463	168,450	174,310
Secondary	51,800	r68,568	r72,117	69,658	67,566
Magnesium metal, primary	8,309	9,015	8,899	8,548	7,900
Molybdenum	13,943	11,174	12,198	12,850	16,460
Nickel:					
Mine output, metal content[10]	128,310	126,481	r184,802	160,247	85,935
Metal, smelter	89,231	83,747	152,299	109,303	58,636
Platinum-group metals ---- troy ounces	346,212	197,943	410,757	382,667	276,189
Selenium, refined[11] ---- kilograms	392,777	511,704	e453,600	350,010	273,325
Silver ---- thousand troy ounces	40,733	36,874	34,401	36,311	41,269
Tellurium, refined[11] ---- kilograms	45,299	47,204	45,000	21,297	15,684
Tin, mine output, metal content	360	337	r243	239	153
Titanium:					
Ilmenite, gross weight ---- thousand tons	1,810	r1,004	r1,853	2,008	1,735
Sorelslag (70% to 72% TiO_2)	850,032	477,040	r847,710	759,191	669,000
Tungsten, mine output, W content	r2,285	2,597	3,179	1,993	2,420
Uranium oxide (U_3O_8)	8,211	7,701	r7,947	8,853	9,657
Zinc:					
Mine output, metal content	1,066,902	1,099,926	r1,058,714	1,095,958	1,141,455
Metal, refined, primary	495,420	580,449	591,565	618,650	511,870
NONMETALS					
Asbestos ---- thousand tons	1,422	1,493	1,323	1,122	839
Barite	87,996	67,131	r94,317	86,117	27,744
Cement, hydraulic[12] ---- thousand tons	10,318	11,765	10,497	10,145	8,080
Clays and clay products[13] ---- value, thousands	$109,635	$142,356	$133,611	$119,116	$94,656
Diatomite	2,184	1,452	r3,615	3,600	NA
Gypsum and anhydrite ---- thousand tons	8,074	8,098	7,209	7,025	6,202
Lime ---- do	2,034	r1,860	2,554	2,555	2,197
Magnesite, dolomite, brucite ---- value, thousands	$5,990	r$6,990	$10,405	$11,472	$13,556
Nepheline syenite	599,121	605,699	592,000	587,565	513,538
Nitrogen: N content of ammonia	1,926,200	1,918,300	r2,095,577	2,176,249	2,057,070
Pigments, mineral: Iron oxides, natural	--	2,700	e2,800	([14])	--
Potash, K_2O equivalent ---- thousand tons	6,340	7,074	7,532	6,549	5,197
Pyrites and pyrrhotite, gross weight	9,203	31,032	32,000	10,198	19,268
Salt ---- thousand tons	6,452	6,881	7,700	7,240	8,076
Sand and gravel ---- do	272,092	285,221	276,452	259,661	207,227
Silica (quartz) ---- do	2,165	2,368	r2,525	2,238	1,610
Sodium compounds, n.e.s.:					
Sodium carbonate[e]	450,000	450,000	450,000	r475,000	475,000
Sodium sulfate	376,563	443,279	r480,666	535,214	542,839
Stone[15] ---- thousand tons	122,144	109,719	103,366	85,041	61,929
Sulfur:					
Elemental byproduct:					
Of smelter gases ---- do	676	667	r895	783	570
Of sour natural gas ---- do	6,248	5,935	r6,221	5,706	5,700
Of refineries ---- do	200	200	190	120	120
Of tar sands ---- do	118	213	300	250	250
S content of pyrite and pyrrhotite[e] ---- do	5	12	r14	5	9
Talc, soapstone, pyrophyllite	61,661	90,330	r91,848	82,715	67,429
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	130,000	135,000	135,000	r130,000	130,000
Coal:					
Bituminous and subbituminous ---- thousand tons	25,419	r28,187	r30,717	33,290	35,317
Lignite ---- do	5,058	r5,013	r5,971	6,798	7,494
Coke, high-temperature ---- do	4,968	r5,685	r5,250	4,659	4,000
Gas, natural:					
Gross ---- million cubic feet	3,569,046	3,780,145	3,541,024	3,019,191	3,076,002
Marketed ---- do	3,128,056	3,334,618	3,067,711	2,399,415	2,446,927
Natural gas liquids:					
Gross:					
Butane ---- thousand 42-gallon barrels	21,133	22,820	21,292	20,443	20,375
Propane ---- do	32,792	35,844	34,188	33,016	33,547
Pentanes plus ---- do	42,423	42,038	38,089	36,420	35,366

See footnotes at end of table.

Table 1.—Canada: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Natural gas liquids —Continued					
Gross —Continued					
Ethane thousand 42-gallon barrels	6,329	20,612	20,475	29,541	26,698
Condensate do	1,174	1,255	[r]1,188	1,881	936
Total do	103,851	122,569	[r]115,232	121,301	116,922
Returned to formation, all types do	397	[e]400	NA	NA	NA
Peat	435,457	480,087	466,000	461,993	446,696
Petroleum and refinery products:					
Crude[16] thousand 42-gallon barrels	478,435	545,465	523,441	467,701	461,804
Refinery products:					
Gasoline:					
Aviation do	1,460	1,572	1,472	1,480	1,066
Other do	230,616	240,554	241,778	239,707	212,126
Jet fuel do	28,100	30,867	30,537	28,841	25,153
Kerosine do	23,557	24,991	24,184	18,575	16,256
Distillate fuel oil do	166,974	184,002	181,930	171,907	146,938
Residual fuel oil do	108,665	113,730	102,124	100,707	74,472
Lubricants do	4,551	5,366	5,720	5,898	4,860
Other:					
Liquefied petroleum gas do	13,070	13,485	13,520	16,337	16,101
Petrochemical feedstocks do	29,683	35,059	32,894	32,366	28,900
Asphalt do	18,628	21,241	20,907	19,139	16,065
Petroleum coke do	1,258	1,029	1,218	20,327	10,623
Unspecified do	3,711	5,440	5,310		
Refinery fuel and losses do	33,742	34,491	32,035	40,360	36,186
Total do	664,015	711,827	693,629	695,644	588,746

[e]Estimated. [p]Preliminary. [r]Revised. W Withheld to avoid disclosing company proprietary data. NA Not available.

[1]Table includes data available through July 31, 1983.

[2]Sb content of antimonial lead alloys, flue dust, and doré slag estimated on the basis of reported gross production.

[3]Refined metal and bullion from domestic ores plus recoverable Bi content of exported concentrates.

[4]Refined metal from domestic ores plus recoverable Cd content of exported ores and concentrates.

[5]Actual output not reported. Data represent Co content of all products derived from ores of Canadian origin, including nickel oxide sinter shipped to the United Kingdom and nickel-copper-cobalt matte shipped to Norway for further processing.

[6]Actual output not reported. Data represent the output within Canada of metallic cobalt from ores of both Canadian and non-Canadian origin.

[7]Blister copper from domestic ores plus recoverable Cu content of exported matte and concentrates.

[8]Series revised to reflect actual mine production rather than sales, which were reported as production in previous editions. Sales figures, on a gross weight basis, in thousand metric tons, follow: 1978—42,931; 1979—59,617; 1980—50,866; 1981—49,844; and 1982—41,865.

[9]Includes shipments of ingots from primary plants for rolling elsewhere.

[10]Refined nickel from domestic ores plus Ni content of oxide produced and recoverable Ni content of exported matte.

[11]From all sources, including imports and secondary sources.

[12]Cement shipped and/or used by producers.

[13]Includes bentonite products from common clay, stoneware clay, fire clay, and other clays.

[14]Revised to zero.

[15]Crushed, building, ornamental, paving, and similar stone.

[16]Includes synthetic crude (from oil shale and/or tar sands).

Table 2.—Canada: Annual values of mineral production for selected years

Year	Production value (millions)	GNP[1] (millions)	Percent of GNP	Value per capita
1940	$530	$6,713	7.9	$46.39
1950	1,045	18,491	5.7	76.24
1960	2,493	38,359	6.5	139.48
1970	5,722	85,685	6.7	266.58
1980	31,842	291,869	10.9	1.330.28
1982[e]	33,081	354,352	9.3	[2]1,340.08

[e]Estimated.

[1]Gross national product (GNP).

[2]Population of Canada, October 1982, was 24,686,400.

Sources: Department of Energy, Mines and Resources, Canada, and Statistics Canada, 1982.

Table 3.—Canada: Mineral production in 1982, by commodity

(Percent)

Commodity	Share of total[P]
Petroleum, crude	35.4
Natural gas	21.4
Natural gas products	6.5
Coal	3.9
Iron ore	3.7
Copper	3.6
Zinc	3.4
Gold	2.8
Potash	1.9
Nickel	1.8
Sulfur, elemental	1.8
Other	13.8
Total	100.0

[P]Preliminary.

Sources: Department of Energy, Mines and Resources, Canada, and Statistics Canada, 1982.

TRADE

In total volume of trade, Canada ranked sixth in the world. The trade and investment relationship between the United States and Canada was extremely close. In 1981, about 17% of all U.S. exports went to Canada, and Canada supplied about 18% of total U.S. imports. The United States was the largest foreign investor in Canada, with an estimated $42 billion in investments or 80% of total foreign investment in Canada. Similarly, Canada's $14 billion investment in the United States represented about 15% of the total direct investment in the United States. U.S. investments in Canada were primarily in mining and smelting industries, petroleum, chemical, manufacturing, and finance. Canada's investment in the United States was concentrated in petroleum, real estate, manufacturing, and trade.

The Canadian mineral industry is mainly export oriented, and the industry exported an estimated $24 billion worth of crude and fabricated mineral products, or 30% of total domestic commodity exports. The United States received about 70% of these export products. The European Economic Community (EEC) and Japan received about 9.6% and 7.8%, respectively. Since the industry depends heavily on export markets, it is very sensitive to economic conditions in the rest of the world. This was the third year in succession that demand for Canadian minerals fell.

Canada is dependent on other sources of supply for bauxite, phosphate rock, chromium, manganese, and tin. Other minerals are also imported for economic and geographical reasons. Crude mineral imports were valued at $7.8 billion. The energy minerals, crude oil, natural gas, and coal, accounted for about 76% of all mineral imports.

Table 4.—Canada: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	39,541	43,697	38,030	United Kingdom 2,034; France 940; Venezuela 803.
Metal including alloys:				
Scrap	78,616	77,987	61,733	Japan 14,845; Taiwan 398; Spain 352.
Unwrought	784,817	725,440	509,775	Japan 124,629; Thailand 15,075; Hong Kong 9,724.
Semimanufactures[1]	42,264	40,546	27,743	Pakistan 1,750; Indonesia 1,032; Colombia 711.

See footnotes at end of table.

Table 4.—Canada: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Cadmium: Metal including alloys, all forms	1,096	1,453	913	United Kingdom 531; Italy 5; Netherlands 3.
Cobalt:				
Oxides and hydroxides	1,091	601	--	All to United Kingdom.
Metal including alloys, all forms	327	676	625	Netherlands 27; Brazil 8; Switzerland 7.
Copper:				
Ore and concentrate	286,075	276,810	2,175	Japan 198,396; Norway 24,987; Republic of Korea 19,818.
Ash and residue containing copper	322	677	624	Netherlands 27; Brazil 8; Switzerland 7.
Metal including alloys:				
Scrap	43,115	35,185	27,158	India 1,888; Belgium-Luxembourg 1,221; Republic of Korea 528.
Unwrought	335,196	262,641	84,137	United Kingdom 74,377; West Germany 31,756; Belgium-Luxembourg 17,786.
Semimanufactures	40,436	39,248	27,963	Venezuela 2,516.
Gold:				
Ore and concentrate troy ounces	202,170	176,901	19,352	Japan 105,095; Taiwan 5,841; West Germany 5,187.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,924	2,677	2,375	NA.
Iron and steel:				
Iron ore and concentrate thousand tons	39,021	40,545	19,237	United Kingdom 5,833; Netherlands 5,093; Japan 4,105.
Metal:				
Scrap do	785	572	451	Italy 57; Spain 49; Japan 9.
Pig iron, cast iron, related materials	740,703	589,619	264,918	Netherlands 141,480; Spain 78,695; Italy 60,856.
Ferroalloys:				
Ferromanganese	11,298	57,039	56,584	Jamaica 92; Philippines 92; Malaysia 37.
Ferrosilicon	52,377	52,410	23,688	Japan 24,717; Republic of Korea 1,102; United Kingdom 774.
Unspecified	r6,234	5,316	3,098	United Kingdom 1,703; Italy 155; Japan 144.
Steel, primary forms	327,139	894,595	714,337	Algeria 76,497; Mexico 22,977; Indonesia 20,589.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	1,151	880	743	Mexico 43; Egypt 32; Ecuador 13.
Universals, plates, sheets do	1,314	975	723	Argentina 52; Thailand 35; Republic of Korea 21.
Rails and accessories	253,772	192,688	106,561	Mexico 69,753; United Kingdom 8,618; Ivory Coast 4,799.
Wire	96,274	106,857	104,997	Hong Kong 619; China 145.
Tubes, pipes, fittings	409,239	502,915	459,814	Iraq 32,062; United Kingdom 3,432.
Castings and forgings, rough	133,354	143,884	141,606	Ireland 392; Thailand 339; Mexico 318.
Lead:				
Ore and concentrate	147,007	146,090	41,943	Japan 51,715; Belgium-Luxembourg 18,832; West Germany 13,622.
Metal including alloys:				
Scrap	21,106	9,781	2,967	Sweden 2,269; Brazil 1,783; Taiwan 1,328.
Unwrought	126,539	119,815	57,809	United Kingdom 32,534; Italy 6,560; Belgium-Luxembourg 6,003.
Semimanufactures	4,682	6,819	3,325	U.S.S.R. 2,699; Republic of Korea 346; Denmark 273.
Magnesium: Metal including alloys	5,317	6,222	1,254	West Germany 1,515; United Kingdom 1,243; Japan 1,210.
Metalloids: Selenium	307	299	163	United Kingdom 65; Netherlands 20; Spain 16.
Molybdenum: Ore and concentrate[2]	14,584	13,664	1,002	Belgium-Luxembourg 3,470; Japan 2,743; West Germany 2,080.
Nickel:				
Ore and concentrate	42,647	53,840	10	Norway 31,437; United Kingdom 22,393.

See footnotes at end of table.

Table 4.—Canada: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel —Continued				
Oxides and hydroxides	16,989	14,390	7,678	NA.
Metal including alloys:				
Scrap	2,664	2,777	2,188	West Germany 264; Austria 99; India 50.
Unwrought	92,396	79,934	49,936	NA.
Semimanufactures	19,086	13,380	10,156	Belgium-Luxembourg 1,008; Netherlands 509; India 315.
Platinum-group metals:				
Ore and concentrate troy ounces	397,656	324,546	453	United Kingdom 324,093.
Metal including alloys, unwrought and partly wrought do	[r]37,174	32,148	23,515	Japan 6,500; United Kingdom 1,872; Brazil 256.
Silver:				
Ore and concentrate thousand troy ounces	12,754	17,571	4,160	Japan 7,030; Belgium-Luxembourg 4,415; West Germany 569.
Metal including alloys, unwrought and partly wrought do	28,506	29,415	29,204	United Kingdom 101; Japan 37; Dominican Republic 14.
Tin: Ore and concentrate	870	513	383	Mexico 67; Spain 50; United Kingdom 13.
Titanium: Ore and concentrate[3]	[4]9,239	NA		
Uranium and/or thorium: Ore and concentrate value, thousands	[r]$230,662	$179,384	$152,473	U.S.S.R. $3,182; Norway $2,862; Republic of Korea $2,022.
Zinc:				
Ore and concentrate	434,177	516,209	35,895	Belgium-Luxembourg 191,414; Japan 118,468.
Blue powder	3,645	5,656	5,393	United Arab Emirates 107; Trinidad and Tobago 80; Venezuela 60.
Metal including alloys:				
Scrap	22,195	28,962	18,888	Belgium-Luxembourg 3,520; West Germany 3,287; United Kingdom 2,173.
Unwrought	471,949	453,525	304,438	United Kingdom 31,741; India 10,774; Venezuela 10,039.
Semimanufactures	3,722	2,622	2,238	Venezuela 150; New Zealand 72; Dominican Republic 59.
Other:				
Ores and concentrates	[r]65,004	116,810	17,259	Belgium-Luxembourg 42,753; West Germany 40,705; Austria 10,715.
Oxides and hydroxides	132,879	241,817	122,432	Australia 100,477; Japan 16,959; United Kingdom 648.
Ashes and residues	20,532	47,591	39,131	Taiwan 7,177; West Germany 291; Japan 215.
Base metals including alloys, all forms	[r]1,900	1,727	1,384	Belgium-Luxembourg 127; France 90; Netherlands 33.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	85	332	330	St. Pierre and Miquelon 2.
Artificial:				
Corundum	166,328	157,990	152,959	United Kingdom 4,240.
Silicon carbide	72,416	67,143	65,809	Japan 1,334.
Grinding and polishing wheels and stones value, thousands	[r]$2,323	$3,134	$2,090	New Zealand $185; Australia $146; Finland $114.
Asbestos, crude	--	10	--	All to Turkey.
Barite and witherite	650	405	405	
Cement thousand tons	[r]1,551	1,579	1,513	Saudi Arabia 60; Bermuda 2; St. Pierre and Miquelon 1.
Clays and clay products:				
Crude do	821	631	630	France ([5]).
Products:				
Nonrefractory value, thousands	$2,526	$2,356	$1,652	Nigeria $506; Chile $54; Panama $30.
Refractory including nonclay brick	68,490	47,187	20,543	Venezuela 3,718; Cuba 1,854; Dominican Republic 1,298.
Diamond:				
Gem, not set or strung carats	28,929	60,140	41,601	Belgium-Luxembourg 9,553; Israel 4,385; United Kingdom 1,530.
Industrial, dust and powder do	260,612	338,138	229,076	Australia 87,330; Ireland 10,552; United Kingdom 5,034.

See footnotes at end of table.

Table 4.—Canada: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials: Manufactured:				
Ammonia	431,019	467,531	467,530	St. Pierre and Miquelon 1.
Nitrogenous thousand tons	1,317	1,349	1,271	Philippines 31; Mexico 18; India 13.
Potassic do	10,565	10,068	6,797	China 552; Japan 530; Brazil 406.
Gypsum and plaster do	4,960	5,095	5,081	Bahamas 14.
Lime	403,172	432,844	430,960	Honduras 1,244; Barbados 415.
Pigments, mineral: Iron oxides and hydroxides, processed	15,932	19,017	18,936	West Germany 18; Yugoslavia 17; Panama 8.
Precious and semiprecious stones other than diamond value, thousands	r$2,594	$2,715	$1,651	Switzerland $350; Taiwan $176; United Kingdom $129.
Salt and brine thousand tons	r1,656	1,508	1,480	Cuba 14; Zaire 5; Guyana 4.
Sodium and potassium compounds, n.e.s.: Sodium sulfate, natural and manufactured	246,116	284,280	274,630	Egypt 4,091; Portugal 3,567; Venezuela 1,002.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	72,900	127,965	103,474	Bahamas 15,735; Bermuda 7,167; France 706.
Limestone other than dimension thousand tons	2,215	1,758	1,758	
Quartz and quartzite	63,166	119,347	119,347	
Sand and gravel	386,437	318,635	239,642	Bermuda 78,889; France 49.
Sulfur:				
Elemental thousand tons	6,851	7,309	1,513	Brazil 632; Australia 591; Morocco 519.
Sulfuric acid	323,776	337,518	336,363	Peru 1,143.
Talc, steatite, soapstone, pyrophyllite	[4]3,539	NA		
Other: Crude value, thousands	r$91,655	$117,303	$41,697	West Germany $27,967; Belgium-Luxembourg $19,003; France $16,021.
MINERAL FUELS AND RELATED MATERIALS				
Coke and semicoke	342,276	190,879	166,624	Spain 16,891; Venezuela 7,311; New Zealand 25.
Gas, natural million cubic feet	810,935	765,882	765,882	
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	78,192	59,783	59,782	France ([5]).
Refinery products:				
Liquefied petroleum gas do	40,528	44,063	41,619	Japan 2,423; Mexico 17; St. Pierre and Miquelon 2.
Gasoline do	4,444	3,780	3,553	Zaire 147; Senegal 36; St. Pierre and Miquelon 26.
Distillate fuel oil do	13,821	11,171	6,662	Netherlands 2,322; Zaire 660; Brazil 512.
Lubricants do	85	83	64	West Germany 4; United Kingdom 3; St. Pierre and Miquelon 2.
Residual fuel oil do	13,093	13,025	10,774	Italy 972; Turkey 515; Netherlands 514.
Asphalt do	1,004	1,643	1,632	United Kingdom 6; United Arab Emirates 2; France 1.
Petroleum coke do	831	1,100	252	Japan 451; Netherlands 222; Australia 155.
Tars and other crude chemicals derived from coal, gas, and petroleum	r20,110	24,738	24,271	Italy 145; Netherlands 133; United Kingdom 86.

rRevised. NA Not available.
[1]May include relatively minor quantities of certain shapes not normally included among semimanufactures.
[2]Includes some scrap.
[3]Largely, if not all, used in production of heavy aggregate.
[4]Partial figure; data given are U.S. imports for consumption only.
[5]Less than 1/2 unit.

Table 5.—Canada: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	3,504	2,702	32	Brazil 1,385; Guinea 661; Guyana 503.
Oxides and hydroxides	983,971	1,020,549	247,267	Jamaica 299,843; Australia 289,957; Japan 166,244.
Metal including alloys:				
Scrap	30,724	33,413	33,373	NA.
Unwrought	13,961	2,885	1,983	United Kingdom 462.
Semimanufactures	114,100	122,176	106,539	Belgium-Luxembourg 5,823.
Antimony: Oxides	944	936	215	United Kingdom 543; Belgium-Luxembourg 158.
Chromium:				
Ore and concentrate	28,373	47,625	28,492	Philippines 8,214; Republic of South Africa 6,080; Albania 4,781.
Oxides and hydroxides	1,717	1,791	1,365	United Kingdom 214; Italy 158.
Copper:				
Ore and concentrate	12,744	19,551	6,908	Chile 6,505; Peru 6,130.
Sulfate	142	339	115	Netherlands 144; United Kingdom 80.
Metal including alloys:				
Scrap	35,051	37,973	37,867	Haiti 46; United Kingdom 21; Mexico 18.
Unwrought and semimanufactures	19,937	24,097	17,059	West Germany 2,548; United Kingdom 533.
Gold:				
Ore and concentrate troy ounces	60,877	74,203	40,124	Chile 32,011; Liberia 1,057.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,249	2,220	1,859	Switzerland 89; United Kingdom 8.
Iron and steel:				
Iron ore and concentrate thousand tons	5,875	5,794	5,537	Brazil 257.
Metal:				
Scrap do	r1,119	835	835	
Pig iron, cast iron, related materials	r11,851	16,735	11,465	Brazil 5,232; West Germany 21; United Kingdom 17.
Ferroalloys:				
Ferrochromium	41,369	31,579	9,839	Republic of South Africa 13,024; Brazil 5,400.
Ferromanganese	26,704	36,656	15,995	Republic of South Africa 16,344; Norway 3,800.
Ferrosilicomanganese	20,901	12,669	4,396	Republic of South Africa 4,563; Norway 2,476.
Ferrosilicon	18,508	18,629	14,422	Norway 3,208.
Ferrotungsten	7	5	5	
Ferrovanadium	520	562	491	Republic of South Africa 33; Austria 17; United Kingdom 15.
Unspecified	10,506	17,804	4,037	West Germany 9,840; France 1,845.
Steel, primary forms	104,647	98,585	76,310	Netherlands 20,657; Italy 1,047.
Semimanufactures:				
Bars, rods, angles, shapes, sections	397,542	577,726	132,083	Japan 225,054; West Germany 78,266.
Universals, plates, sheets	582,215	1,717,434	616,676	West Germany 301,397; Japan 182,102; United Kingdom 131,018.
Rails and accessories	r26,328	37,265	15,647	France 12,122; United Kingdom 3,373; Belgium-Luxembourg 3,041.
Wire	35,270	44,494	16,056	United Kingdom 11,052; France 9,951; Belgium-Luxembourg 3,835.
Tubes, pipes, fittings	322,111	364,804	102,692	Japan 151,643; Republic of Korea 31,375; United Kingdom 13,180.
Castings and forgings, rough	129,363	118,474	104,201	United Kingdom 13,180.
Lead:				
Oxides	926	1,364	1,180	Mexico 95; Republic of South Africa 66.
Metal including alloys, all forms	2,602	9,220	8,206	Mexico 997.
Magnesium: Metal including alloys, all forms	3,820	3,718	3,614	United Kingdom 102.
Manganese:				
Ore and concentrate	95,161	119,746	5,147	Gabon 59,076; Republic of South Africa 43,051; Brazil 12,467.
Metal including alloys, all forms	6,957	10,371	383	Republic of South Africa 9,684; China 224; Japan 75.
Mercury 76-pound flasks	1,464	1,399	1,301	Spain 50; China 39.
Molybdenum: Oxides and hydroxides	362	423	364	West Germany 36; Netherlands 23.

See footnotes at end of table.

Table 5.—Canada: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Ore and concentrate	26,149	23,760	9,094	Belgium-Luxembourg 5,488; Australia 4,580; Norway 2,000.
Metal including alloys:				
Unwrought	5,224	2,925	1,361	Norway 1,266; U.S.S.R. 191; United Kingdom 93.
Semimanufactures	2,268	2,955	1,590	West Germany 725; Sweden 600.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	34,227	22,107	14,278	United Kingdom 7,829.
Silver:				
Ore and concentrate[1] value, thousands	r$989,785	$624,828	$588,194	Republic of South Africa $8,889; Peru $7,724; Panama $6,491.
Metal including alloys, unwrought and partly wrought thousand troy ounces	10,903	10,524	9,145	Mexico 485; Cuba 250; West Germany 196.
Tin: Metal including alloys, all forms	4,527	3,811	2,011	Bolivia 917; Brazil 422; Singapore 365.
Titanium:				
Oxides	r3,597	4,096	2,226	France 842; West Germany 569; Spain 246.
Metal including alloys, all forms	r616	552	463	United Kingdom 33; West Germany 20; Netherlands 20.
Tungsten: Ore and concentrate	r3	8	8	
Zinc:				
Ore and concentrate	r34,911	41,815	40,411	Bolivia 721; Republic of South Africa 420; Peru 162.
Oxides	r894	764	555	United Kingdom 126; Netherlands 74; China 9.
Blue powder	r137	223	222	Japan 1.
Metal including alloys:				
Unwrought	r424	4,745	477	Peru 1,759; West Germany 1,525; Belgium-Luxembourg 879.
Semimanufactures	r326	468	288	Belgium-Luxembourg 147; West Germany 33.
Zirconium: Metal including alloys, all forms	229	289	221	France 68.
Other:				
Ores and concentrates	r88,782	85,772	48,958	Republic of South Africa 19,514; Australia 14,943; Peru 839.
Base metals including alloys, all forms	r1,707	1,773	1,558	United Kingdom 64; West Germany 45; Republic of South Africa 20.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	r33,722	22,803	22,720	Republic of South Africa 43; Italy 25.
Grinding and polishing wheels and stones value, thousands	r$18,370	$20,141	$13,858	Italy $1,848; West Germany $1,350.
Asbestos, crude	1,156	934	297	Republic of South Africa 637.
Barite and witherite	r45,157	16,277	10,962	Ireland 5,000; Netherlands 254; United Kingdom 61.
Boron materials: Oxides and acids	12,940	6,775	6,766	Belgium-Luxembourg 6; Japan 3.
Cement	r82,179	232,060	207,591	Japan 22,600; United Kingdom 1,664.
Clays and clay products:				
Crude:				
Bentonite	471,683	311,458	208,880	Greece 102,578.
Chamotte earth	19,719	13,540	13,540	
Fire clay	39,334	49,172	49,153	West Germany 19.
Kaolin	254,350	231,755	212,175	United Kingdom 19,580.
Unspecified	122,416	142,237	140,613	West Germany 1,459; United Kingdom 111; France 34.
Products:				
Nonrefractory value, thousands	$54,219	$74,707	$6,798	Italy $31,036; Spain $9,284; Japan $8,990.
Refractory including nonclay brick do	$88,664	$103,788	$87,318	West Germany $3,716; United Kingdom $1,347; Austria $1,155.
Cryolite and chiolite	274	495	84	Netherlands 61; Denmark 35.
Diamond:				
Gem, not set or strung carats	133,308	190,833	61,402	Belgium-Luxembourg 69,446; Israel 33,282.
Industrial thousand carats	1,343	1,504	892	Ireland 388; U.S.S.R. 118; Belgium-Luxembourg 45.

See footnotes at end of table.

Table 5.—Canada: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diatomite and other infusorial earth	26,577	25,544	25,381	United Kingdom 163.
Feldspar, fluorspar, related materials: Fluorspar	223,940	173,599	18,991	Mexico 46,214; Morocco 39,302; Republic of South Africa 27,516.
Fertilizer materials: Crude, phosphate rock thousand tons	r3,817	3,245	3,245	
Manufactured: Nitrogenous	r136,505	150,979	133,339	Netherlands 9,608; West Germany 472.
Phosphatic	248,381	306,501	304,674	Belgium-Luxembourg 1,467; Israel 342; United Kingdom 18.
Potassic	82,852	79,745	72,740	East Germany 7,003.
Unspecified and mixed	123,374	89,842	89,617	Netherlands 56.
Gypsum and plaster	154,717	143,500	17,217	Mexico 126,166; United Kingdom 117.
Halogens: Iodine	271	181	6	Japan 174; Chile 1.
Lime	40,901	23,105	23,062	France 43.
Magnesium compounds: Other	76,600	59,018	49,171	Greece 5,170; Spain 2,397; West Germany 2,181.
Mica: Crude including splittings and waste	2,597	3,133	3,132	India 1.
Pigments, mineral: Iron oxides and hydroxides, processed	8,869	8,410	5,972	West Germany 1,192; Spain 621; France 373.
Precious and semiprecious stones other than diamond: Gem material value, thousands	r$24,744	$35,544	$11,782	China $5,134; Switzerland $4,065; Hong Kong $2,088.
Salt and brine thousand tons	1,151	1,255	1,003	Mexico 228; Spain 23; Portugal 1.
Sodium and potassium compounds, n.e.s.: Potassium hydroxide including sodic and potassic peroxides	4,188	3,150	2,725	France 140; West Germany 133; Japan 68.
Sodium carbonate, natural and manufactured	161,383	138,651	138,498	West Germany 93; United Kingdom 60.
Sodium hydroxide	206,757	215,960	189,799	West Germany 8,196; Netherlands 7,040; Norway 4,026.
Sodium sulfate, natural and manufactured	20,211	12,480	1,363	United Kingdom 11,117.
Stone, sand and gravel: Dimension stone: Crude and partly worked	58,039	60,081	28,486	Republic of South Africa 20,514; Italy 7,243.
Worked value, thousands	r$4,367	$5,999	$676	Italy $4,902; Portugal $112.
Dolomite, chiefly refractory-grade	4,316	5,121	5,030	United Kingdom 91.
Limestone other than dimension thousand tons	2,418	2,527	2,526	France (2).
Quartz and quartzite	280	251	251	
Sand other than metal-bearing thousand tons	1,200	1,143	1,143	
Unspecified do	1,210	1,446	1,439	West Germany 7.
Sulfur: Elemental, all forms	1,767	4,615	4,615	
Sulfuric acid and oleum	18,048	82,494	28,804	West Germany 35,749; Norway 12,695; United Kingdom 5,246.
Talc, steatite, soapstone, pyrophyllite	r50,774	30,322	28,657	Japan 1,428; Italy 226; United Kingdom 10.
Other: Crude value, thousands	r$11,467	$13,355	$12,361	Mexico $300; West Germany $179; United Kingdom $92.
Oxides and hydroxides of barium, magnesium, strontium	28,373	26,153	24,813	United Kingdom 766; Japan 316; China 102.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value, thousands	$3,787	$2,266	$2,235	United Kingdom $27; France $3.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural do	$1,568	$1,242	$1,134	West Germany $93; East Germany $15.
Carbon: Carbon black	9,663	9,387	9,217	United Kingdom 87; France 35; West Germany 34.
Coal: All grades including briquets thousand tons	r15,735	14,703	14,703	
Coke and semicoke	403,377	500,108	500,108	

See footnotes at end of table.

Table 5.—Canada: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Gas: Hydrocarbon, natural million cubic feet	104	143	143	
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	205,736	189,667	25,355	Saudi Arabia 58,378; Venezuela 54,656; Mexico 18,373.
Refinery products:				
Liquefied petroleum gas do	1,682	7,059	7,059	
Gasoline do	r1,473	579	146	Italy 219; Greece 214.
Mineral jelly and wax do	r47	40	NA	NA.
Kerosine and jet fuel do	396	564	9	Trinidad and Tobago 295; Venezuela 120; Belgium-Luxembourg 116.
Distillate fuel oil do	r177	534	40	Netherlands Antilles 285; Trinidad and Tobago 209.
Lubricants do	r676	494	404	Trinidad and Tobago 85; United Kingdom 2.
Naphtha do	28	32	32	
Residual fuel oil do	r9,435	7,300	1,747	Venezuela 4,334; West Germany 404; Netherlands Antilles 294.
Asphalt do	225	210	210	
Petroleum coke do	r4,995	5,147	4,571	United Kingdom 346; Argentina 230.
Unspecified do	713	1,044	707	Trinidad and Tobago 175; Netherlands Antilles 155.
Tars and other crude chemicals derived from coal, gas, and petroleum	119,542	129,734	81,204	NA.

rRevised. NA Not available.
[1]May contain ore and concentrate of platinum-group metals.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Canadian Reynolds Metals Co. Ltd. and Aluminum Co. of Canada Ltd. (ALCAN) were the two companies reported to be producing primary aluminum metal. Canadian Reynolds operates a smelter at Baie Comeau, Quebec, with a total capacity of 159,000 tons per year. The company was planning a $500 million expansion to 272,000 tons per year. The project was reported to be proceeding after the Quebec government in 1982 agreed to reduce electricity rates by 50% for 5 years.

Péchiney Ugine Kuhlmann Group was also negotiating with the Quebec government for reduced electricity rates for its proposed aluminum smelter at Becancour. Although feasibility studies indicated that the first 110,000-ton-per-year potline could start producing in 1986, with a final expansion to 330,000 tons per year possible, no decision to proceed with the project had been reached at yearend.

ALCAN has five smelters in Quebec, at Jonquiere, Grande Baie, Isle Maligne, Sharigan, and Beauharnois, and one at Kitimat, British Columbia, with a total capacity of 1,018,000 tons per year. ALCAN reduced capital expenditures to conserve cash; however, work continued on the Grande Baie project, which was 99% complete. The proposed $1.25 billion Manitoba smelter and hydroelectric project was postponed. Technical studies were planned to investigate the possibility of a 180,000-ton-per-year aluminum smelter near Vanderhoof, British Columbia, in conjunction with the expansion of ALCAN's Kemano hydroelectric plant, which supplies power to its Kitimat operation. ALCAN purchased a site for the possible construction of an aluminum smelter at Laterriere, near Jonquiere, Quebec. The company feels that three or four new smelters would be required in Canada over the next 20 years to satisfy the expected growth in demand for primary aluminum.

The Canadian companies were able to take advantage of low power cost to maintain production output at an average of 90% of capacity. Production of primary aluminum, at an estimated 1,065,000 tons, fell only about 5% compared with that of 1981, and exports of aluminum ingot and other fabricated forms rose by about 13% over those of 1981. However, profits still suffered because of low ingot prices.

Canada imports all of its aluminum ore requirements in the form of either bauxite or alumina. The bauxite was imported mainly from Brazil, Guinea, and Guyana, and the alumina was imported mainly from the United States, Jamaica, and Australia.

Copper.—Canadian copper producers operated at a loss during 1982. With prices below production costs for most Canadian copper producers, nearly all mines were closed for varying periods of time. Some mines were expected to be closed until the price of copper improves and inventory levels are decreased. Canadian copper production averaged 60% of normal, with a mine production output of 606,202 tons. This was 2% lower than the 1981 output of 619,328 tons. Output in 1983 was expected to be even lower than that of 1982. This situation was expected to continue unless there is a marked improvement in the price of copper.

British Columbia was the largest copper-producing Province in Canada and accounted for about 44% of all Canadian copper produced. Nearly all producing copper mines in the Province suffered losses. Noranda Mines Ltd. closed its Granisle Mine in July, reportedly for 1 year. Substantial losses were reported by the company as a reason for the closure. Subsequently, in October, the company also closed its Bell copper mine for an indefinite period. Bethlehem Copper Corp. closed its Jersey Mine in July because operations were uneconomical at present copper prices. Canada Wide Mines Ltd. continued mining developed ore at its Granduc Mine although production was limited to 50% of its 3,600-ton-per-day capacity.

Westmin Resources Ltd.'s Buttle Mine was one of the few profitable copper producers in Canada. The company was continuing with exploration and development of its H-W ore body, where ore reserves were estimated to be over 12 million tons. The company was also continuing with its project to triple the mill capacity to 2,700 tons per day by 1984.

Ontario was the second largest copper-producing Province in Canada, accounting for 29% of all Canadian copper produced. Interrupted production and reduced work forces were common to copper producers in 1982. Inco Ltd. closed its Ontario operations in midyear and was scheduled to reopen in early 1983. The Kidd Creek Mines Ltd., formerly Texas Gulf Canada Ltd., new Mitsubishi-type copper smelter came on-stream in November. The company closed for 10 days in December and was reducing its work force by 200 employees over several months. Early in the year, Pamour Porcupine Mines Ltd., Schumaker Div., suspended production from its copper zone. Hudson Bay Mining and Smelting Co. Ltd. critically reviewed its Monitoba-Saskatchewan mining operations and decided to defer capital expenditures and development work as much as possible. The company also suspended mining operations for an 8-week period during the summer. Inco closed its Thompson, Manitoba, mines in November and tentatively scheduled production to resume in early 1983.

Gold.—In Canada, gold was produced in every Province and Territory except Prince Edward Island and Nova Scotia and was a major factor in establishing the Canadian mining industry. Canada has ranked third in the world in gold production for nearly 50 years and continues in this position after the Republic of South Africa and the U.S.S.R. Quebec was the leading gold-producing Province, followed by Ontario and British Columbia. In 1982, there were 39 gold mines in Canada. However, a significant amount of gold was produced as a byproduct from base metal mines. One major gold producer came onstream during the year. Echo Bay Mines Ltd.'s new Lupin Mine started operation in October. The deposit is located 265 miles northeast of Yellowknife, Northwest Territories, near the Arctic Circle. The mine has a design capacity of 950 tons per day. Development work was continuing to establish reserves.

The Department of Energy, Mines and Resources of Canada reported that the volume of gold production at 2,008,000 troy ounces was higher than the 1,672,930 troy ounces produced in 1981 and attributed the increase to two factors. First, the lower price of gold required producers to mine higher grade ore, and secondly, a number of new gold mines began production near the end of 1981, making a significant impact on 1982 total output.

The $300 per ounce price level appears to be a profit-loss cutoff point for a number of marginal underground producers in Canada. When the price of gold went below the $300 per ounce level, the high-cost, low-grade gold producers reacted by revising their mining operations and by reducing their work force to lower production costs. No major gold mining operations closed in 1982.

In Ontario, the Detour Lake project, a joint venture between Amoco Canada Petro-

leum Co. Ltd., the company that discovered the ore body, and Campbell Red Lake Mines Ltd., was proceeding. Overburden stripping was begun. The project, expected to become the largest gold mine in Canada, was scheduled to be in operation by late 1983, with a milling rate of 2,000 metric tons per day from open pit operations. Plans called for mill capacity to be increased to 4,000 tons per day in 1987 with the additional ore to be supplied from an underground mine. Mine reserves were reported to be 25.2 million tons to a depth of 1,800 feet grading 4.285 grams of gold per ton, 5.14 grams of silver per ton, and 1.21% copper.

Dome Mines Ltd. was completing the final stages of its $92 million expansion program. Construction of the new 5,400-foot No. 8 shaft was underway; previously existing ore storage, grinding, amalgamation, and thickening facilities were replaced, and new water storage and fire protection facilities were constructed. Mill capacity was to be increased by 50% from 2,000 to 3,000 tons per day, and gold output was to be increased to 119,000 ounces per year by late 1984.

The Hemlo, Ontario, gold rush was the bright spot for Canadian exploration in 1982. The Hemlo Goldfield lies 21 miles east of Marathon on the northeast shore of Lake Superior. An estimated 40 to 50 companies were carrying out intense staking and exploration programs in the area. Major companies such as Noranda Exploration Co. Ltd., Teck Corp., and Long Lac Minerals Ltd. were active in the area. Goliath Gold Mine Ltd. and Gold Sceptre Resources Ltd., the original major players in the Hemlo gold deposit, are now under option to Noranda Exploration. The Hemlo area is estimated to contain over 13 million tons of ore averaging 0.236 ounce of gold; however, the total reserves were still undetermined. There was industry speculation that Hemlo would be a world-class gold deposit. In any case, the Hemlo area was sure to dominate Ontario's exploration scene in the near future.

Placer mining was less active during the year. A base price of $400 per troy ounce was considered essential to the viability of many gold placer operations. With the price of gold below that minimum during the spring, some operators decided it was uneconomical to start production. Others operated at reduced rates. Severe spring ice conditions delayed most startup dates. Queenstake Resources Ltd. continued its bucketline dredging operation on Clear Creek, near Dawson City, Yukon Territory. The company has various placer operations in the Yukon Territory and Northern British Columbia and was expecting annual production to exceed 6,000 troy ounces of fine gold.

Iron Ore.—The iron ore producers of Labrador-Quebec, source of over 85% of Canadian iron ore, had extended shutdowns of 3 to 5 months during the last half of 1982. Production declined sharply from the already depressed level of 1981, and the industry operated at about 50% of annual capacity. Most Ontario producers also closed their iron ore operations for 2 to 3 months during the latter half of the year. These actions reflected the general decrease in demand for steel and attempts by producers to reduce their iron ore inventories.

Western Labrador, the most important iron ore mining area of Canada, was particularly impacted by the depressed market. Iron Ore Co. of Canada (IOC) suspended operations at its Carol Project in Labrador City for 11 weeks. Although operations resumed in September, part of the pellet plant and concentrator remained closed at yearend. IOC also announced in November that it would permanently close its Schefferville operation in the spring of 1983. Direct reduced iron (DRI) plants also were either closed or operated at reduced capacity in 1982. The Sidbec-Normines Inc. DRI plant at Contrecoeur, Quebec, was the only plant operating in North America at yearend. Falconbridge Ltd. announced it was intending to close its Westfrob Mine at Tasu, British Columbia, in 1983 because all economic iron ore reserves were expected to be exhausted.

The Canadian iron ore producers were not expecting the iron ore market to improve in the near future. The world recession had serious effects on the markets Canadian iron ore exporters serve. High inventory levels, increased foreign competition, and reduced consumer demand were expected to inhibit Canadian iron ore production through 1983.

Iron and Steel.—Faced with a shortage of orders for its products and disruption of traditional markets at the close of 1981, the Canadian iron and steel industry entered 1982 in a declining market that continued throughout the year. High inventory levels, low demand, and competition from imports caused Canadian steelmakers to critically reassess their operations and marketing programs. It was reported that at yearend approximately 27% of the labor force had been laid off and the industry was operating at 45% of capacity. Production of crude

steel decreased almost 20% from the 1981 level. Canadian iron and steel producers were investigating various measures to improve efficiency by using the best available technology to lower their costs and were intensifying their export marketing efforts.

Lead and Zinc.—Canada was the world's largest producer of zinc and the third largest producer of lead, after the United States and the U.S.S.R. Declining consumption, rising costs, and low prices contributed to a continuing slack market in 1982. Canadian producers began shutdowns in June and July that lasted for varying periods of time. Lead and zinc prices weakened in an extremely competitive market, and the profits of the Canadian producers that continued to operate were low, and in some cases, losses occurred. Programs to reduce costs and increase efficiency by lead-zinc mines and refineries continued.

Refined lead production was reported to be an estimated 241,876 tons, up 3,768 tons from that of 1981, despite the shutdown during July of Cominco Ltd.'s Trail, British Columbia, facility. Zinc metal production was reported as an estimated 511,870 tons, down from the 618,650 tons produced in 1981. Both the Faro Mine of Cyprus Anvil Mining Corp. and the Elsa Mine of United Keno Hill Mines Ltd. closed indefinitely in June.

Brunswick Mining and Smelting Corp. Ltd. postponed construction of a proposed $360 million zinc reduction plant at Belledune, New Brunswick, until market conditions improve.

The eastern Arctic was one of the few bright spots on the Canadian mining scene. Cominco Ltd.'s Polaris Mine on Little Cornwallis Island, about 80 miles south of the North Magnetic Pole, came onstream in early 1982. At full design capacity, the Polaris concentrator will produce 130,000 tons per year of zinc and 30,000 tons per year of lead in concentrates. Concentrates are stored until the ice retreats and the "Arctic window" shipping season begins in late June or early July. The shipping season usually lasts from 60 to 80 days depending on open-water conditions. The Polaris project was Canada's most northerly mine and considered a masterpiece of Arctic engineering. The Nanisivik Mines Ltd.'s lead and zinc mine on the northern tip of Baffin Island continued production and development. The company was also conducting exploration on the northern part of Baffin Island.

Nickel.—The continuing weak world nickel market forced Canadian producers to operate below capacity and maintain tight controls over production. The low Canadian nickel production of 85,935 tons was the result of extensive shutdowns by both Inco and Falconbridge. Both companies closed their Sudbury operations in June 1982 and were shut down at yearend. Inco's Port Colborne refinery and Shebandowan Mine were also closed for the same period of time. Inco's Thompson operation was closed during November and December and was scheduled to reopen in early 1983. Falconbridge and Inco both announced operations would resume at Sudbury in early 1983.

The Ontario-Canada Task Force report on Sudbury smelters was released in late 1982. The report indicated that technical solutions to substantially reduce sulfur dioxide emissions could be implemented by Inco and Falconbridge. The report also suggested that if Inco was to build a new smelter there would be substantial savings in labor, energy, and maintenance cost. The estimated cost of building a new smelter was $500 million. Methods for raising the necessary capital for construction were not addressed.

The nickel-producing companies were seeking ways to increase efficiency and productivity and were preparing for lower production rates when production begins again. When operations do resume, the work force was expected to be significantly less than it was at the beginning of 1982.

Platinum-Group Metals.—The platinum-group metals produced in Canada were mainly recovered as a byproduct in the treatment of nickel-copper sulfide ores. Inco and Falconbridge were the two major producers of platinum-group metals. When these two companies stopped nickel production in midyear, platinum-group metals recovery was severely limited. Some production was attained through the processing of refinery slimes. However, this supply only lasted until the latter part of the year. Canadian production of platinum-group metals depends directly on the demand and production of nickel as may be seen by the reduced output of 276,189 troy ounces compared with 382,667 troy ounces in 1981.

Silver.—Canada continued to be a major world producer of silver and ranked third after Mexico and Peru. Primary silver production was estimated at 41.3 million troy ounces compared with 36.3 million troy ounces in 1981 and was valued at $378.8 million, compared with $458.1 million in 1981. The decrease in value, despite an increase in production, was the result of the

sharp decline in the price of silver during 1982. Production increased in the Atlantic Provinces, British Columbia and Ontario, and decreased in the remaining Provinces and Territories.

It was reported that a number of mines scheduled for production in the next few years have been placed on hold until the price of silver increases and shows some signs of stability. Low silver prices contributed to the indefinite closure of United Keno Hill and Cyprus Anvil operations in the Yukon Territory. British Columbia continued to be the largest silver-producing Province in Canada. The Equity Silver Mines Ltd.'s mine in north-central British Columbia was the largest silver producer in Canada with an output of 7 million troy ounces.

Other Metals.—Consolidated Durham Mines and Resources Ltd.'s Lake George Mine was Canada's only antimony mine. The mine closed in May 1981 although sales of concentrates continued until mid-1982. The company announced in late 1982 that it would allow the mine to flood until market conditions for antimony improved. Prior to flooding, exploration had outlined a new ore zone containing an estimated 774,000 tons averaging 4.15% antimony. Byproduct antimony is recovered in varying amounts as antimonial lead from lead ores and as sodium antimoniate from the leaching of silver-copper concentrates.

In response to a market that had developed for arsenic-containing products in Canada, Cominco constructed an arsenic trioxide recovery plant at its Con gold mine, Yellowknife, Northwest Territory. The plant will produce 99.5%-pure arsenic trioxide from arseniferous sludge accumulated from roasting arseniferous ores to recover contained gold. The reported capacity of the plant was 15 tons per day with an estimated cost of about $13 million.

Production of cobalt decreased by about 16% from that of 1981. Two companies, Inco and Falconbridge, produced cobalt as a byproduct of domestically produced nickel-copper ores. A third, Sherritt Gordon Mines Ltd. recovered cobalt from nickeliferous materials refined from toll and purchased nickeliferous materials. Inco also produced crude cobalt oxide at its Port Colborne, Ontario, and Thompson, Manitoba, plants, which was shipped to its Clydach, Wales, refinery for manufacturing various oxide and salt compounds. The prolonged shutdown of Inco and Falconbridge's Sudbury operations affected the production of cobalt. Work continued on Inco's electrolytic plant at Port Colborne. The $25 million facility was expected to come onstream in early 1983 and would have a production capacity of 907 tons per year of cobalt metal. In 1982, as a result of weak markets and high inventory levels, major Canadian molybdenum producers instituted extensive production cutbacks. However, molybdenum output rose 28% above that of 1981 to an estimated 16,500 tons. Producers were expected to continue production constraints into early 1983.

QIT-Fer et Titane Inc. (QIT) was the only company that mined titanium ore in Canada. Ilmenite, a titanium-bearing mineral, was mined from QIT's open pit operation near Havre St. Pierre, Quebec. It was then shipped to Sorel, Quebec, for electric-furnace smelting into titania slag (Sorelslag) that grades 70% to 72% titanium dioxide. Also, two manganese pig iron products were produced. QIT was planning to construct a $10 million, dry concentrating plant, which would permit production of a superconcentrate with a high-titanium dioxide content. In 1982, Kennecott Corp. acquired a one-third minority interest in QIT, held by Exploration de Zinc New Jersey (Canada) Limitée.

Canadian production of tungsten came from two companies. Canada Tungsten Mining Corp. Ltd. supplied the major portion and Dimac Resource Corp. accounted for the remainder. Because of the weakness of the tungsten market, both companies reduced production during the year. At year-end, both companies announced indefinite shutdown of operations until there is a significant improvement in the tungsten market.

NONMETALS

Asbestos.—Weak demand and high inventories of asbestos fiber continued. The decline in shipments caused numerous operations to shut down from one to several weeks. Production of asbestos fiber continued to drop for the third consecutive year. Quebec, the major asbestos-producing area in Canada, continued to be impacted by weak markets. In February, Société Asbestos Limitée (SAL) suspended operations at its Asbestos Hill Mine in Ungava for the remainder of the year. SAL also closed its British Canadian II Mine in December for 2 years.

Potash.—The Canadian potash market continued to be disappointing in 1982. Shipments were down 9% compared with those

of 1981. Exports to the United States were also 20% below those of 1981. Producers with high inventory levels at the beginning of 1982 instituted sharp production cuts during the year. At yearend, stocks were still higher than normal levels. Canpotex Ltd., the offshore marketing company for Saskatchewan potash producers, reported exports down almost 14% below 1981 levels. Major Saskatchewan producers were expecting 1983 to be another difficult year with overall capacity utilization to be approximately 65%.

Sulfur.—Canadian production of sulfur in 1982 was from three sources: elemental sulfur from sour natural gas and tar sands; sulfuric acid from smelter gases; and pyrite concentrates. The major source was sour natural gas produced mainly in Alberta from 43 sour gas plants. Canada was the world's largest exporter of sulfur, accounting for 45% of the total world sulfur trade. The world market was very important with exports accounting for 70% of all sales. The United States was the largest customer, consuming 1.3 million tons, or 13%, of elemental sulfur. Demand for Canadian sulfur and sulfuric acid was expected to keep pace with growth in the world economy.

Other Nonmetals.—Cement and gypsum production, down in 1982, was a direct reflection of the construction industry. Cement shipments were reported down an estimated 20% below those of 1981, and capacity, unchanged at 15.9 million tons per year, was slightly more than 50% utilized. Gypsum production was estimated at about 12% less than the 1981 level. There were plant closures and layoffs for varying lengths of time in 1982 in response to high inventories and weak demand.

Canada was the world's foremost producer of nepheline syenite, which was mined by two producers, Indusmin Ltd. and IMC Industry Group (Canada) Ltd., from extensive deposits in Methuen Township near Peterborough, Ontario. Production was lower than that of 1981 by about 15%. Exports to the United States accounted for about 70% of shipments. The glass industry accounted for most of the consumption of nepheline syenite.

Production of salt from all sources in Canada in 1982 was estimated at 8.1 million tons. Most of the rock salt produced in Canada came from Nova Scotia and Ontario, while Alberta, Saskatchewan, and Ontario accounted for salt in brines production. Seleine Mines Inc. brought its 1.25-million-ton-per-year underground salt mine on the Madeleine Islands into production in August. Potash Co. of America began shipping salt in October from its New Brunswick operation near Sussex.

Shipments of talc were up 18% although exports to the United States fell over 50%. Canadian Talc Industries Ltd., near Madoc, Ontario; B.S.Q. Talc Inc. near Broughton Station, Quebec; Bakertalc Inc. near South Bolton, Quebec; and Steetley Talc Ltd. near Timmins, Ontario, were the four companies that produced talc in Canada. Talc is used primarily in paints, paper, ceramics, as a filler and whitener, and also in the production of wallboard. Canadian producers were optimistic about increased production with recovery of the economy and through increased exports. A new talc plant was being considered for construction in Ontario.

MINERAL FUELS

Coal.—The Canadian coal industry continued to grow, with production up an estimated 5% over 1981 production. Development of new mines and expansion of existing facilities were proceeding. There was investment in new mines and also investment and expansion of related infrastructures. Railway and port facilities were being upgraded and expanded.

Canada's one giant coal project, the North East Coal Development Project, in British Columbia was continuing. The gigantic project, consisting of the $850 million Quinette Coal Ltd. project controlled by Denison Mines Ltd. and the $300 million Bullmoose project of Teck Corp., was scheduled to start shipment of metallurgical and thermal coal by the end of 1983. The reported total annual production of North East Coal Development, now under contract to the Japanese steel industry, was 7.2 million tons. The project, which involves the spending of about $2.5 billion for development and related infrastructure, is the largest mining sector development in Canada's history.

Natural Gas.—The supply of natural gas continued to exceed Canada's domestic requirement and authorized export market in 1982. The National Energy Board conducted hearings and was expected to authorize additional gas exports sometime in 1983, to stimulate declining drilling activity. The natural gas industry viewed access to export markets as the key to unlocking Canada's natural gas potential and would welcome additional export allowances. It was felt that the Arctic Islands could hold the

largest gasfields outside the Soviet Union, and Canada was considering methods to bring the gas to market in the United States or Europe. A proposed $2.3 million project would haul a liquefied natural gas (LNG) processing plant by barge to Melville Island. After processing, the gas would be shipped to the United States or Europe via ice-proof LNG tankers. Another possible method of transport would be by LNG-carrying submarines. General Dynamics Corp. reportedly had plans for a submarine that could deliver almost 5 million cubic feet of LNG to the Eastern United States for $3.60 per thousand cubic feet compared with about $5.00 per thousand cubic feet by conventional tanker.

Peat.—Canada, with about 170 million hectares of peatland area, was considered to have the world's largest peat resources. Previously, peat resources were mainly exploited as a horticulture medium. However, it is now believed that peat could provide a significant contribution in terms of energy as an alternative fuel. Provinces with peatland resources were engaged in resource surveys and inventories. Almost 10 million hectares, corresponding to approximately 42 billion tons of peat, was considered available for energy production. This would be equivalent to about 72 billion barrels of oil. Nova Scotia was continuing with its Peatland Inventory Program. Almost 60% of the 16 million tons of peat surveyed was considered fuel peat. New Brunswick was also continuing to evaluate its peat potential. Peat dewatering and processing technology was undergoing development in Canada, and potential applications were being investigated. Some applications being reviewed were sod peat production for residential and nonresidential space heating, industrial-process heat generation, and power generation using a small-scale peat gasifier.

Petroleum.—Falling world energy prices heavily impacted Canadian budgets, which are highly dependent on oil and gas income. Both the Federal and Provincial Governments in 1982 proposed a series of programs that were designed to provide tax relief and increase exploration and development in an effort to stimulate the petroleum industry. The search for oil was further encouraged by higher prices provided for new oil. Sable Island, off Nova Scotia, the Hibernia Field off New Foundland, the Arctic Islands, and the Beaufort Sea continue to be active areas for exploration and development. There was a higher level of oil-related activity in Manitoba, Saskatchewan, and Alberta than in the previous 2 years. Significant discoveries were made, mostly in previously known oil regions.

Uranium.—The uranium market remained depressed in 1982. Canada had seven primary uranium producers until midyear, at which time two ceased operations. Eldorado Nuclear Ltd. closed its Beaverlodge Mine near Uranium City, Saskatchewan, in June. In July, Madawaska Mines Ltd. ceased all mining and milling operations at its mine near Bancroft, Ontario. The Key Lake Mine and mill was expected to be brought into production in 1983, with an annual production capacity of 5,000 tons of uranium. It was expected to be Canada's largest single producer and one of the largest uranium mines in the world. Sixty-four percent of primary uranium output during the year was produced in Ontario, with the remainder from Saskatchewan. Uranium mined and milled in Canada was refined and converted into nuclear fuel material by Eldorado Resources Ltd., the Federal Crown Corp. There was a decrease in exploration activity, reflecting the decline of the spot market price and lower projected short-term sales prospects. Nova Scotia continued its moratorium on new uranium exploration licenses, including renewal of existing licenses. The Federal Government was undertaking a $9.5 million, 5-year research program aimed at speeding the development of technology to determine the harmful effects of wastes resulting from the mining and milling of uranium.

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[1]For more detailed information on the mineral industry of Canada, see the Canadian Mineral Surveys for 1980 and 1981, both of which were prepared by the Mineral Policy and Energy Policy Sectors, Department of Energy, Mines and Resources, Canada. The U.S. Department of the Interior, Bureau of Mines, has arranged to have these Canadian publications placed in libraries in each of the 50 States and Puerto Rico as follows: University of Alabama, Tuscaloosa; E. E. Rasmuson Library, University of Alaska, Fairbanks; University of Arizona, Tucson; University of Arkansas, Fayetteville; California State Library, Sacramento; A. Lake Library, Colorado School of Mines, Golden; Wilbur Cross Library, University of Connecticut, Storrs; H. M. Morris Library, University of Delaware, Newark; Strozier Library, Florida State Library, Tallahassee; P. Gilbert Memorial Library, Georgia Institute of Technology, Atlanta; University of Hawaii, Hilo; University of Idaho, Moscow; Morris Library, Southern Illinois University, Carbondale; Indiana University, Bloomington; Iowa State University of Science and Technology, Ames; Watson Library, University of Kansas, Lawrence; M. L. King Library, University of Kentucky, Lexington; University of Southwestern Louisiana, Lafayette; R. H. Folger Library, University of Maine, Orono; Eisenhower Library, John Hopkins University, Baltimore, Md.; Massachusetts Institute of Technology Library, Cambridge; Wilson Library, University of Minnesota, Minneapolis; University of Southern Mississippi, Hattiesburg; Rolla Library, University of Missouri, Rolla; Montana College of Mineral Science and Technology, Butte; D. L. Love Library, Nebraska Geological Survey at University of Nebraska, Lincoln; University of Nevada, Reno; University of New Hampshire, Durham; J. C. Dana Library, Rutgers University, Newark, N.J.; New Mexico Institute of Mining and

Technology, Socorro; Columbia University, New York; D. H. Hill Library, North Carolina State University, Raleigh; Frity Library, University of North Dakota, Grand Forks; Ohio State University, Columbus; University of Oklahoma, Norman; Multnomah County Library, Portland, Ore.; Pennsylvania State University, University Park; University of Rhode Island, Kingston; University of South Carolina Undergraduate Library, The Horseshoe, Columbia; South Dakota School of Mines and Technology, Rapid City; Tennessee State Library and Archives, Nashville; Main Library, University of Texas, Austin; Marriott Library, University of Utah, Salt Lake City; Bailey Library, University of Vermont, Burlington; Virginia Polytechnic Institute, Blacksburg; University of Washington, Seattle; West Virginia University, Morgantown; Memorial Library, University of Wisconsin, Madison; University of Wyoming, Laramie; and University of Puerto Rico, Mayagüez.

[2]Physical scientist, Division of Foreign Data.

[3]Where necessary, values have been converted from Canadian dollars (CAN$) to U.S. dollars at the rate of CAN$1.2324=US$1.00.

The Mineral Industry of Chile

By Pablo Velasco[1]

Chile retained its dominant role as one of the world's leading metal producers in 1982, and for the first time moved up from third to first place in world copper mining production replacing the United States as the leading world copper producer. Chile continued to rank second in world molybdenum and iodine production. In addition, the country was a significant producer of iron ore, natural nitrates, silver, gold, and vanadium.

After growing an average of over 8% per year between 1977 and 1981, Chilean gross domestic product fell 14.1% below that of 1981 because of the world economic recession. This was equivalent to 330.1 billion in 1977 Chilean pesos[2] or $23.61 billion[3] in U.S. currency. The decline in production was felt in all economic sectors except for mining and fishing. Most affected were construction, manufacturing, and commerce, which fell 28.8%, 21.9%, and 14.6%, respectively.

In the mining sector there were increases in copper (14.8%), molybdenum (30.5%), gold (35.7%), and petroleum (3.4%), all relative to 1981. However, because of reduced output in other mineral commodities, the overall sector growth rate was 4% above that of 1981. Both large-scale and the medium- to small-scale mining concerns participated in the sector's growth. Smaller and medium-sized companies, which had been languishing at the beginning of the year, were particularly benefited by Government policy as the year progressed. The devaluation of the peso and pricing policies of the Empresa Nacional de Minería (ENAMI), a state-owned mining company that markets much of the output of smaller producers, combined to create conditions permitting these smaller mining firms to expand. The Corporación Nacional del Cobre de Chile (CODELCO-Chile) reached a record annual production of 1.03 million tons, up 15.6% over that of 1981. Increases were also registered in molybdenum and metal doré. Profitability rose 65% over that of 1981 to $160.6 million.

As a result of world liquidity problems, net inflow of new credits entering Chile declined to $866.5 million from $2.95 billion in 1981. Foreign obligations reached $17.1 billion at the end of 1982 and the balance of payments had a $1.16 billion deficit with reserves falling $1.20 to $2.58 billion to cover the shortfall. One primary cause of Chile's financial problems was the low price of copper, which accounts for nearly 60% of the nation's revenue from mineral exports, which fell to its lowest level in 30 years.

Investments were sharply reduced. There was a 28.8% and 53.3% decline below that of 1981 in construction activity and capital-good imports, both areas of rapid growth in earlier years.

Foreign investment set a new record of $383.8 million for 260 investments that eventually will introduce $529.9 million in foreign capital into Chile. Mining is by far the most significant sector attracting foreign investment. According to Chile's Oficina de Planificación Nacional (ODEPLAN), multinational companies have invested $786.6 million in recent years in the development of five large-scale metal-mining projects in Chile. An additional $140.6 million in investments was approved by yearend. The largest project so far has been the development and operation of La Disputada de Las Condes copper deposit, where Exxon Minerals Chile Inc. has invested more than $450 million since January 1978, including $118 million during 1982. St. Joe International Corp. (Fluor Corp.) has invested $244 million in the El Indio gold mine, which is already in production.

A dramatic improvement occurred in the energy sector when a 3.4% increase over that of 1981 in domestic oil production

raised Chile's output to 15.6 million barrels and domestic consumption dropped imports from 20.1 to 9.12 million barrels. The total crude oil import bill fell 60.6% below that of 1981 to $277.3 million.

Government Policies and Programs.— On January 21, the Chilean law (Organic Law No. 18,907) for the granting of mining concessions was issued. However, it will not go into effect until the new mining code is issued, reportedly in late 1983. The new law replaces the 1932 law and is an amplification of the constitution, hence it is considered to have constitutional force and is titled an "Organic Act." Among important features of the new law are (1) a claim system that grants both foreign and national concession holders real and immovable rights, (2) mining concessions will be issued by ordinary courts of justice rather than Government agencies, which is a significant change from the old law. Exact procedures for the establishment of a mining concession will be outlined in the new mining code, (3) concessions that exist on the date the new code comes into effect will continue to exist. Further amplification of Organic Law No. 18,907 was made in an August 31 meeting conducted by Chilean Government officials. Highlights of this presentation were that (1) CODELCO-Chile will remain state-owned, all other mines will be open to private concession holders, (2) new mining deposits will be exploited by private enterprises, (3) taxation levies for foreign investors will not exceed 49.5%, (4) special case provisions will be made for lithium, whose exploitation will be done by the Government, and (5) the new Organic Law explicitly guarantees a market value compensation for the concession in the event of expropriation. The expropriated party may protest the legality of the expropriation action before the ordinary courts of justice of the country and will, at all times, have the right to indemnization.

The Chilean Constitution enacted in March 1981 established the basis for the development of hydrocarbon deposits. Although all hydrocarbon deposits are the property of the state, exploration and exploitation can be executed by private firms through administrative concessions or by operation contracts. Decree Laws 1089 and 1820 established the regulations for petroleum operation contracts, sometimes referred to as "risk contracts." This type of contract allows for exploration in a specific area within a given time frame. If oil or gas is found, it is extracted with all responsibilities and costs paid for by the contractor. Benefits to the contractor are related to the amount of oil or gas extracted. Two operation contracts have been awarded in the past. Both remain in effect. One is with Atlantic Richfield Corp. and the other is with Phillips Petroleum Co.

PRODUCTION

The mining sector expanded 4% over that of 1981 and, in contrast to the situation in many other countries, was one of the healthiest. Both the large-scale and small- and medium-scale mining companies participated in the sector's growth. Chile's output of 1.24 million tons of fine copper was up 14.8% from that of 1981. Production of both copper and copper's principal byproduct, molybdenum, reached record levels. Molybdenum production rose 30.5% over that of 1981. CODELCO-Chile produced 83.3% of the total Chilean copper production. Medium- and small-scale mining produced the balance. Among the CODELCO-Chile operations, Chuquicamata accounted for 53.5% of the total output followed by El Teniente, 32%; El Salvador, 8.7%; and Andina, 5.3%. Chilean gold production was up by 35.7% over that of 1981, primarily owing to the recently developed El Indio Mine, which completed its first year of full production. The El Indio Mining Co. was the largest privately owned Chilean exporter with sales totaling $126.6 million. St. Joe Minerals Corp. of the United States is the majority owner. Production of silver increased 6% over that of 1981. Production also increased in nearly all other mineral commodities. As for mineral fuels, coal output decreased 14.7% below that of 1981 and output of petroleum crude increased 3.4% over that of 1981 to 15.6 million barrels.

Table 1.—Chile: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Copper:					
Mine output, metal content[3]	[r]1,034,200	[r]1,062,700	1,067,900	1,081,100	[4]1,240,700
Metal:					
Smelter, primary[5]	[r]926,600	[r]948,900	953,100	953,800	[4]1,046,800
Refined:[6]					
Fire, primary refined	151,900	161,800	147,100	140,600	[4]153,288
Electrolytic	597,200	617,700	663,600	635,000	[4]698,312
Total	749,100	779,500	810,700	775,600[e]	[4]851,600
Gold, mine output, metal content—troy ounces	102,287	111,405	219,773	400,479	[4]543,569
Iron and steel:					
Ore and concentrate:					
Gross weight—thousand tons	[r]7,813	[r]8,226	8,835	8,514	6,470
Iron content[e]—do.	[r]4,811	[r]5,058	[r]5,344	[r]5,190	[4]3,874
Pig iron—do.	539	611	648	582	[4]454
Ferroalloys:					
Ferromanganese	5,853	5,221	5,684	5,254	5,000
Silicomanganese	132	256	219	104	150
Ferrosilicon	2,173	5,063	5,385	2,477	2,500
Other	66	892	515	656	600
Total	8,224	11,432	11,803	8,491	8,250
Steel, crude[7]—thousand tons	[r]597	657	704	644	487
Semimanufactures (hot-rolled)	[r]413	[r]422	516	512	392
Lead, mine output, metal content	431	252	315	223	1,522
Manganese ore and concentrate	23,243	24,969	27,701	25,557	[4]16,111
Molybdenum, mine output, metal content	13,196	[r]13,559	13,668	15,360	[4]20,048
Selenium—kilograms	[r]30,089	[r]38,950	17,100	33,665	[4]23,011
Silver—thousand troy ounces	8,210	8,740	9,598	11,610	[4]12,288
Vanadium, mine output, metal content[e 8]	690	450	272	127	90
Zinc, mine output, metal content	1,814	1,847	1,134	1,516	[4]5,656
NONMETALS					
Barite	182,422	226,767	225,529	259,349	[4]292,402
Borates, crude, natural (ulexite)	26,544	3,049	3,275	3,277	3,200
Cement, hydraulic—thousand tons	1,177	1,353	1,583	1,863	1,080
Clays:					
Kaolin	48,117	59,222	59,452	56,778	[4]20,202
Other (unspecified)	80,986	129,829	158,391	178,128	[4]34,842
Diatomite	5,008	763	1,147	358	[4]387
Feldspar	903	133	2,150	2,506	[4]469
Gypsum:					
Crude	174,143	162,482	198,115	237,853	[4]89,636
Calcined	48,601	54,917	74,435	103,344	90,350
Iodine, elemental	1,922	2,410	2,601	2,688	[4]2,596
Lime, hydraulic[e]—thousand tons	[r]709	[r]789	[r]778	[r]648	650
Nitrogen: Natural crude nitrates:					
Sodium	422,975	467,200	440,000	471,170	[4]420,750
Potassium-enriched	106,670	154,100	180,400	153,230	[4]156,000
Phosphates: Guano	240	--	--	1,100	[4]1,427
Pigments, mineral, natural: Iron oxide	5,263	2,590	4,451	4,890	[4]2,445
Potash, K_2O equivalent	[r e]14,900	[r]21,600	25,300	21,400	20,120
Pumice (includes pozzolan)	[r]182,526	220,088	249,805	277,359	[4]172,382
Quartz, common	194,443	141,079	162,663	165,393	[4]159,813
Salt, all types	393,499	589,845	441,105	290,279	[4]674,002
Sodium compounds:					
Sodium carbonate[e]	10,800	10,800	10,800	10,000	NA
Sodium sulfate[9]	47,783	[r]70,427	71,315	58,677	[4]48,146
Stone:					
Limestone—thousand tons	2,188	2,300	2,766	2,923	[4]1,665
Marble	7,552	3,882	2,505	1,879	[4]963
Sulfur:					
Native, other than Frasch:					
Refined	13,520	11,605	13,925	4,659	[4]6,615
Caliche	18,109	65,290	73,510	109,965	[4]98,372
Byproduct (from industrial gases)	20,709	27,287	[e]26,700	28,000	[4]31,828
Total	52,338	104,182	114,135	142,624	[4]136,815
Talc	432	850	1,139	665	[4]270

See footnotes at end of table.

Table 1.—Chile: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous and lignite thousand tons	1,148	957	1,024	1,169	[4]997
Coke:					
Coke oven do	[e]215	[e]190	191	300	[4]242
Gashouse[e] do	5	5	NA	NA	NA
Gas, natural:					
Gross million cubic feet	228,379	202,423	190,557	179,362	[4]178,834
Marketed do	123,588	138,094	[e]135,000	130,000	[4]124,661
Natural gas liquids:					
Condensate thousand 42-gallon barrels	656	674	[e]650	NA	NA
Natural gasoline do	920	1,200	[e]1,150	NA	NA
Liquefied petroleum gas do	3,076	2,971	[e]2,800	NA	NA
Total do	4,652	4,845	[e]4,600	NA	NA
Petroleum and refinery products:					
Crude do	6,281	7,561	12,159	15,104	[4]15,625
Refinery products:					
Gasoline:					
Aviation do	106	151	31	47	[4]100
Motor do	8,488	8,919	8,397	8,810	[4]9,367
Jet fuel do	1,082	1,258	1,227	1,512	[4]2,151
Kerosine do	2,670	2,025	1,761	1,528	[4]1,559
Distillate fuel oil do	6,736	8,724	8,755	7,515	[4]8,370
Residual fuel oil do	10,182	10,900	10,818	9,165	[4]7,156
Liquefied petroleum gas do	2,616	2,718	2,887	2,648	[4]2,881
Unspecified do	1,558	1,277	1,220	1,510	[4]1,134
Refinery fuel and losses do	1,233	837	628	280	[4]806
Total do	34,671	36,809	35,724	33,015	33,524

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 15, 1983.

[2]In addition to the commodities listed, pyrite is also produced, but available information is inadequate to make reliable estimates of output levels.

[3]Figures are the nonduplicative copper content of ores, concentrates, precipitate, metal, and other copper-bearing products measured at the last stage of processing as reported in available sources.

[4]Reported figure.

[5]Figures are total blister and equivalent copper output including that blister subsequently refined in Chile and copper produced by electrowinning.

[6]Figures are total refined copper distributed into two classes according to method of refining.

[7]Excludes castings.

[8]Estimated on the basis of reported vanadium content of vanadiferous slags imported by the United States from Chile.

[9]Includes natural sodium sulfate and anhydrous sodium sulfate, coproducts of the nitrate industry.

TRADE

Chile's foreign trade is still dominated by mineral products. However, over the past 10 years industrial production has increased in importance and reduced the total export share of mining from the 80% to 90% range, which was normal prior to 1980, down to less than 60% in the last 3 years. Despite an across-the-board drop in metal prices, the country's total exports, in dollar terms, held up quite well because of the large tonnage increase in copper, molybdenum, and precious metal shipped. As a result of the international and domestic recession, floating of the Chilean peso, and increasing influence of Chile's foreign debt payments, the country had a small positive trade balance and a commercial account surplus. The year ended with a deficit in the balance of payments and reduced international reserves. The trade surplus of $293.0 million was a sharp reversal from that of 1981 when a $2.46 billion deficit was recorded. Imports plunged 44.6% below that of 1981 to $3.53 billion as the Chilean peso was devalued on June 14. It was later allowed to float from 39 Chilean pesos to equal 1 U.S. dollar, the rate that had been fixed since 1979. Overall the peso averaged 50.91 Chilean pesos to 1 U.S. dollar for the year and ended the year at 73.57 Chilean pesos to 1 U.S. dollar. The devaluation, combined with the domestic recession, brought imports of consumer goods down 50.2% to $949.2 million, intermediate goods down 37.8% to $2.0 billion, and capital goods down 53.3% to $583.7 million, all compared

with those of 1981. Also showing a significant drop was imported crude oil, falling 60.6% to $227.3 million. While imports plunged, exports were handicapped by lower prices even as the volume sold overseas climbed. Total exports reached $3.82 billion, only slightly lower than in 1981. The decline was mostly attributable to industrial product exports, which fell 7.9% to $1.18 billion.

Compared with 1981, mining exports rose a slight 0.3% as average prices dropped 15.0% for copper, 18.3% for gold, 24.8% for silver, and 35.8% for molybdenum oxide. These declines were compensated by large volume increases. Copper exports, easily Chile's most significant, rose 16.4% to 1.21 million tons for a small increase in value to $1.73 billion. The United States, Japan, the Federal Republic of Germany, Brazil, Venezuela, and Argentina were Chile's major trading partners. The United States alone accounted for almost one-quarter of the country's total foreign trade.

COMMODITY REVIEW

METALS

Copper.—Chile led the world in copper production with an output of 1.24 million tons. The large-scale mining group led by CODELCO-Chile reached an annual production level of 1.03 million tons of fine copper, up 15.6% over that of 1981. The medium- and small-scale mining group production of copper also increased by 10.8%. A large percentage of the credit for the 1982 growth in output resulted from CODELCO-Chile's aggressive production policy. The company implemented a number of streamlining and cost-reduction policies in addition to curtailing planned investments. CODELCO-Chile benefited from the peso devaluation as its exports became more attractively priced abroad. The increase in production was partly a result of the expansion of the copper concentration plants at the Chuquicamata and El Salvador divisions. Also, the El Teniente division put into operation a new underground primary crusher in October. The new facility permits the processing of hard primary ore, increasing El Teniente's production capacity and enhancing its profitability. The project cost $90 million and took 7 years to complete.

CODELCO-Chile continued its rationalization program to improve efficiency of the production process. The results were a 19% decrease in production costs to $223.8 million compared with those of 1981 and a 13% savings in sales and administrative expenses over that of 1981. CODELCO-Chile's operational income increased by 48%. This improvement was due to the large reduction in production costs. Income after taxes was up $63.3 to $160.6 million. The company also increased taxes paid to the Government from $480.3 to $523.9 million. During the year CODELCO-Chile invested $233.7 million in its four divisions: Chuquicamata, El Teniente, El Salvador, and Andina.

Major foreign-owned investments also advanced during the year. Preliminary exploration was finished on the latest project to receive approval, the $1.5 billion Getty Oil Co.-Utah International Inc. "La Escondida" project. Reserves estimated at 500 million tons of ore with a 2% copper content were discovered. Construction of facilities is slated to begin in 1983. Three other major projects under development will require the potential investment of $3.2 billion. They are mines owned by the Exxon Minerals Co. (La Disputada de Las Condes), The Anaconda Company (Los Pelambres), and a consortium headed by Falconbridge Ltd. (Quebrada Blanca). The Chilean Government was forming a new company to develop the Quebrada Blanca porphyry copper deposit, in which Falconbridge will hold a 10.2% interest. The deposit contains about 440 million tons of 0.81% copper and 0.018% molybdenum. An enriched secondary sulfide zone contains 55 million tons of 1.6% copper and 0.019% molybdenum. However, at present prices, development of the deposit is not considered economically feasible.

Table 2.—Chile: Copper production, by sector and company

(Thousand metric tons of fine copper)

Sector and company	1978	1979	1980	1981	1982
LARGE MINES (CODELCO-Chile)					
Chuquicamata	500.7	507.2	510.9	472.4	552.8
El Teniente	250.6	278.2	266.0	291.9	335.9
El Salvador	77.5	78.1	74.8	76.5	89.8
Andina	47.7	46.7	52.8	52.8	54.5
Total	876.5	910.2	904.5	893.6	[1]1,032.9
MEDIUM AND SMALL MINES					
Empresa Nacional de Minería (ENAMI)	[r]78.9	[r]84.2	102.8	99.7	81.3
Mantos Blancos	[r]37.0	[r]35.2	[r]29.8	31.7	57.4
Disputada de Las Condes	[r]28.6	[r]22.0	[r]28.4	[r]39.1	43.2
Pudahuel	1.2	--	0.2	13.8	15.3
Other	[r]12.0	[r]11.1	[r]2.2	[r]3.2	5.1
Total	[r]157.7	[r]152.5	[r]163.4	[r]187.5	202.3
El Indio (byproduct)	--	--	--	--	5.5
Grand total	[r]1,034.2	[r]1,062.7	[r]1,067.9	[r]1,081.1	1,240.7

[r]Revised.
[1]Data do not add to total shown because of independent rounding.

Source: Comisión Chilena del Cobre, April 1983.

Table 3.—Chile: CODELCO-Chile copper output

(Metric tons of fine copper)

Product	1978	1979	1980	1981	1982
Electrolytic	460,852	477,814	505,873	464,665	495,092
Fire refined	117,265	131,706	121,022	112,016	150,348
Blister	134,227	139,368	115,321	153,901	171,446
Concentrate	164,151	161,311	162,297	163,029	216,034
Total	876,495	910,199	904,513	893,611	1,032,920

Source: Corporación Nacional del Cobre de Chile (CODELCO-Chile) 7th Annual Report, 1982.

Iron Ore.—Iron ore output declined 24% below 1981 levels to 6.47 million tons. Iron ore sales were valued at $166 million, an 8% decline from that of 1981. Production of iron ore pellets increased 3.4% to 3.28 million tons. During the year, the Compañía de Acero del Pacífico S.A. (CAP) (Pacific Steel Co.) lost $48 million. The main reasons for the company's poor performance were the stagnant iron sales to Japan and a drastic drop in domestic demand for steel. Chile has been exporting iron ore to Japan for more than 20 years. To lessen these losses, CAP has offered for sale three iron ore deposits: Santa Fé, Algarrobo, and El Romeral; the Huasco iron pelletization plant; and the CAP subsidiary, Manganesos de Atacama S.A. Other candidates for sale to the private sector were the steel bar reroller Cía. de Acero de Rengo S.A. and Cía. Minera del Pacífico S.A. Japan, traditionally the major customer for Chilean iron ore, may take a stake in the iron mines and pellet plant that are to be sold to private interests by CAP.

Iron and Steel.—Crude steel and pig iron production declined 24% and 22%, respectively. Despite earlier announcements, Chile's state steelmaker, Cía. Siderúrgica de Huachipato S.A., a subsidiary of CAP, will not be transferred to the private sector according to Government officials. Faced with a dramatic decline in domestic demand for steel, Huachipato has embarked on a severe cost-cutting program in order to stem its losses. In the first 6 months of the year, the steelmaker's sales slumped to 157,000 tons, compared with 277,000 tons in the first half of 1981, while losses on steelmaking increased to the equivalent of $25 million. As a result of the decline, the Huachipato smelter is now operating at one-third of its 600,000-ton-per-year capacity.

Chile's CAP is hoping to get outside help to finance two major capital spending proj-

ects, a new coke plant and a continuous casting line for its Huachipato facility. The company's existing coke plant is worn out and therefore CAP is under some pressure to implement plans for a 550,000-ton-per-year coke plant at an estimated cost of $160 million. CAP's continuous caster is part of a larger project to expand the plant's capacity from 780,000 to 1 million tons per year with the addition of cold-rolling and finishing facilities, a desulfurizing unit, and other improvements. A third project to expand CAP's Huasco pellet plant from 3.5 to 4 million tons per year would require foreign investors, according to Corporación de Fomento de la Producción (CORFO) officials.

Molybdenum.—CODELCO-Chile molybdenum production increased almost 31%, to 20,048 tons. This improvement was a result of higher output at the Chuquicamata mining division. CODELCO-Chile is the only producer of molybdenum as a byproduct of copper in the country and ranks second in the world after the United States. Conversion of one-half of CODELCO's molybdenum is done by Molibdenos y Metales S.A., a private company that for the last 16 years has been the only Chilean facility processing molybdenum concentrates. It also produces all of Chile's output of ferromolybdenum, molybdenum oxide, and part of the rhenium. CODELCO-Chile's $18 million molybdenite roasting plant came onstream in midyear to produce molybdenum oxide from molybdenite concentrate. Its processing capacity is 5,500 tons per year of fine molybdenum with plans to expand the installation to 10,000 tons per year in the future. Molybdenum consumption in Chile is only 200 to 300 tons per year, primarily oxides as alloys in the steel industry's production of grinding balls and wear plates.

Molybdenum sales amounted to $204.3 million for shipment of 21,792 tons of which 53% of the value was for molybdenite concentrates, 42% for oxide of molybdenum, and 5% for ferromolybdenum. Even though the shipments of molybdenum concentrate increased 22% over that of 1981, sale values of these products were 29.0% lower because of lower molybdenum prices. CODELCO-Chile sold 57% of its molybdenum and ferromolybdenum to Western Europe, mainly to the Netherlands, the United Kingdom, and the Federal Republic of Germany, and the remainder to Canada and Japan.

Precious Metals.—Production of gold and silver increased because the El Indio Mine finished its first year at full production. Gold production increased 35.7% over that of 1981 to 543,569 troy ounces, while silver increased 6.0% to 12.3 million troy ounces.

Cía. Minera El Indio (CMEI) is a Chilean contractual mining company; 80.6% of the shares are held by Compañía Minera San José Ltda. (San José) and the balance by private Chilean shareholders. San José is a wholly owned Chilean subsidiary of St. Joe International Corp. (St. Joe), of New York, United States. During 1981, St. Joe merged with the Fluor Corp. of Irvine, Calif. El Indio is the first mine developed with foreign capital under the current foreign investment program of Chile. The total cost of the facilities has been estimated at over $244 million, of which $100 million has been financed in terms of the foreign investment agreement and the rest by the sale of high grade minerals and by export credits. The El Indio Mine has become the largest privately owned exporter in Chile with foreign sales of $126.6 million during the year.

CMEI, in association with domestic and foreign companies, was continuing to explore nearby properties for other gold and silver deposits. The most promising deposits have been discovered by Chevron Resources Co. a few kilometers north of El Indio. One of these is near Sancarrón and another is near La Laguna; both have high gold content possibilities. Other prospective gold deposits includes "Guanaco," in the north, which was estimated to contain 321,500 troy ounces of gold in high-grade ore. Cía. Minera Mantos Blancos S.A., affiliated with the Marvis Corp. and South American Consolidated Enterprises Corp., was conducting feasibility studies on the Río de Oro deposit, located in Chile's southern tip. Sociedad Minera Montaña de los Molles Ltda. has inaugurated a 200-ton-per-day gold and silver mill at Los Molles, 27 kilometers east of Iquique.

NONMETALS

Cement.—Demand for cement in Chile declined sharply during the year because of the poor economic situation, and as a result profits were significantly lower. Production of cement declined 42% relative to that of 1981 to 1.08 million tons, all of which was consumed domestically. The Fábrica de Cemento El Melón S.A. was planning a two-phase expansion to increase annual output from 750,000 tons to 1.25 million tons per year by yearend.

Iodine.—Chile maintained its position as the second largest iodine producer in the

world after Japan. The Sociedad Química y Minera de Chile S.A. (SOQUIMICH) continued as the only producer of iodine as a byproduct of the processing of nitrate ore in Chile. Byproduct iodine is obtained during the production of sodium nitrate from caliche (salitre). Iodine output during the year decreased 3% from that of 1981 to 2,596 tons. During 1981, the iodine plants in Coya Sur and Pedro de Valdivia were expanded to treat lower grade solutions. This increased iodine output significantly. Export earnings from caliche (salitre) and iodine reached $77.4 million, a 2.4% increase over that of 1981.

Lithium.—Fluor Mining and Metals Inc. of Redwood City, Calif., United States, has been awarded a $6.8 million contract by Sociedad Chilena de Litio Ltda. (SCL) of Chile, to annually produce 6,400 tons (14 million pounds) of lithium carbonate. The contract was part of SCL's $61.2 million investment to start production in 1984. In 1980, Foote completed a 6-year negotiation process and signed a 50-year joint venture contract with Chile's CORFO to launch the $61.2 million lithium carbonate and potash project using concentrates from 16,700 hectares of the Salar de Atacama. Foote is the 55% shareholder and CORFO is the 45% minority shareholder in SCL. The Salar de Atacama project began construction in December 1982.

Chile has the equivalent of an estimated 4 million tons of metallic lithium, considered roughly 39% of the world's known reserves. These are contained in brines in the Salar de Atacama and Salar de Pedernales in the Atacama Desert, about 2,000 kilometers from Santiago. Under the Chilean organic mining law, lithium operations were reserved for the state and fall under the jurisdiction of the Comisión Chilena de Energía Nuclear (CCEN), together with uranium and thorium. CCEN, however, is empowered to permit commercial lithium ventures and the negotiations for such ventures are handled by CORFO.

Natural Sodium Nitrates.—SOQUIMICH was the only producer of sodium nitrate in Chile. Production of natural sodium nitrate declined 11% from that of 1981 to 420,750 tons. Natural sodium nitrate, also known in Chile as saltpeter or Chilean nitrate, usually occurs in deposits associated with sodium chloride, sodium sulfate, and other salts. The largest known deposits are located in Chile. All exports from Chile were of two grades: industrial and agricultural. The industrial-grade exports contained approximately 98% by weight of sodium nitrate. The agricultural-grade exports contained approximately 97% by weight of sodium nitrate and was predominantly used as a fertilizer. Exports of sodium nitrate went predominantly to Europe and the United States with lesser amounts to the Far East and Latin American countries.

SOQUIMICH has been able to keep production costs down by running a more efficient operation. During the last few years the company reduced its work force from 8,000 to 4,500 workers while maintaining the same production level. Production capacity changes in the future would depend on the demand for sodium nitrate. Expansion projects have to show an internal rate of return of at least 16% in real terms in order to be considered.

Other Nonmetals.—CORFO also has a second project to exploit potassium and boron from the Salar de Atacama in northern Chile. Details of a feasibility study relating to this second project were made public in the late part of 1982. The project proposes to produce 500,000 tons per year of potassium chloride, 145,000 tons per year of potassium sulfate, and 28,000 tons per year of boric acid. The shallow brines in the area contain reserves of 4.2 million tons of lithium, 57.7 million tons of potassium, 11 million tons of boron, and 26 million tons of magnesium. One of the companies interested in the Salar de Atacama was Israel Chemicals Ltd., according to CORFO officials Israel Chemicals is presently conducting a feasibility study on producing potassium salts from the deposits.

MINERAL FUELS

Coal.—Coal production declined 15% to slightly less than 1 million tons because of a decline in demand for coal in the country. Average national demand leveled off at about 1.1 million tons in 1978 and had remained at that level until 1981. Then the bankruptcy of Chile's sugar industries, the coal industry's largest customer, further aggravated the decline in demand. Chile possesses large amounts of reserves and resources of subbituminous coal in the Valdivia and Magallanes areas in the south, but only a small quantity was being exploited. All known deposits are in southern Chile.

The national coal company, Empresa Nacional del Carbón S.A. (ENACAR) is the country's largest producer. It controls the Lota Mine, plus three other small mines. The Schwager Mine, Chile's second largest coal mine, became an independent subsid-

iary in 1981.

Compañía de Carbones de Chile Ltda. (COCAR), a private consortium formed by Compañía de Petróleos de Chile S.A. (COPEC) and the English firm, Northern Strip Mining Ltd., has bought the rights to develop the Pecket coal deposit northeast of Punta Arenas near the Strait of Magellan. According to COCAR officials, the Pecket coal reserves amounted to almost 5 billion tons distributed as follows: 500 million tons in the Rubens area, 3.2 billion tons in the Islas de Riesgo, and 1.1 billion tons in the Brunswick Peninsula. According to the Chilean Ministry of Mines, the new mining concession, which authorized the binational company to explore for coal in the southern zone of Chile, had given them until the end of June 1983 to begin installation of surface facilities and to start developing the coal deposit. The exploitation rights are for 50 years. An estimated investment of $120 million will be required to exploit the Pecket coal deposit. This will be partly financed by the International Bank for Reconstruction and Development (World Bank). The World Bank has initially approved a $15 million direct loan to COCAR for the development of the Pecket deposits.

Petroleùm and Natural Gas.—Domestic crude oil production reached 15.6 million barrels, the highest level in Chile's history, about 3.4% above the 1981 level. Primarily because of this increase, Chile provided slightly over one-half of its domestic needs. Chilean production of crude oil has risen steadily since 1978 when the only domestic producer, Empresa Nacional del Petróleo (ENAP), the state-owned oil company, began to exploit its offshore reserves. Prior to this, ENAP was totally dependent on onshore production, which was declining. The offshore program, located in the eastern mouth of the Strait of Magellan, now accounts for 75% of total domestic output (table 4).

Table 4.—Chile: Total crude oil production

(Thousand 42-gallon barrels)

Production area	1979	1980	1981	1982
Tierra del Fuego	2,280	1,825	1,472	--
On Land	3,161	2,752	2,578	3,876
Offshore	2,120	7,582	11,054	11,749
Total	7,561	12,159	15,104	15,625
Percent offshore	28	62	73	75

Source: Empresa Nacional del Petróleo (ENAP).

At present, ENAP has 14 platforms in production and 2 conducting drilling operations in the Strait of Magellan. During 1982, four additional platforms were brought into operation in the Strait of Magellan. Three new offshore deposits were discovered and further exploration continued in the Strait of Magellan.

The Government of Chile was also taking other steps in an attempt to raise future hydrocarbon production. Domestic crude consumption increased 1% over that of 1981 to 33.5 million barrels; however imports, mainly from Venezuela, dropped from 20.1 million barrels in 1981 to 9.12 million barrels. The total crude oil import cost fell 60.6%, to $277.3 million. In addition to the areas presently being exploited or explored, other coastal areas of Chile are considered promising for exploration. ENAP and the Comisión Nacional de Energía (CNE), both state-owned, were calling for prequalification of firms interested in bidding in the exploration and exploitation of hydrocarbons. The schedule was to call for final bids at the end of April for 10 to 12 offshore blocks, each approximately 5,000 square kilometers in the central zone of Chile. Additional areas of interest, such as offshore blocks on the southern coast, would be put up for bid later.

ENAP produced almost 179 billion cubic feet of natural gas from wells in the Strait of Magellan area, decreasing slightly from that of 1981. Propane, butane, and gasoline were extracted and the residual gas was reinjected in the fields to enhance recovery. The city of Punta Arenas also uses some of the residual gas as the area's principal energy source. ENAP and CNE representa-

tives began considering on April 5 preliminary bids to use a 15-year supply of natural gas from the Strait of Magellan area at a rate of 7.7 million cubic meters (275 million cubic feet) per day. Among the proposed uses for this large gas supply were a methanol plant, an ammonia-urea plant and a liquefied natural gas plant. Major firms from the United States, France, and Sweden submitted these proposals. Final bids on all projects were due on November 5, 1982.

In 1981, the 300-megawatt Antuco project was brought onstream to join the Abanico and El Toro plants, forming a complex with a total combined capacity of 836 megawatts in the Concepción area. In 1982, the 460-megawatt, $900 million first stage of the Colbún-Machicura-Chiburgo complex in the Talca area was under construction.

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[1]Physical scientist, Division of Foreign Data

[2]Value and percentage of the 1982 gross domestic product were given as estimated figures in billions of 1977 Chilean pesos (CH$) by the Central Bank. Where necessary, values have been changed from CH$ to U.S. dollars at the rate of CH$27.98 = US$1.00 as of Dec. 31, 1977.

[3]Value of the 1982 gross domestic product was based on an average 1982 exchange rate of CH$51.00 = US$1.00, according to preliminary figures released by the Instituto Nacional de Estadísticas (INE).

The Mineral Industry of China

By E. Chin[1]

After 4 years of deliberation and preparation (1978-82), Government planners proposed an economic objective to quadruple China's gross annual value of industrial and agricultural production in two decades—from 710 billion (US$473 billion) yuan[2] in 1980 to 2,800 billion yuan in the year 2000. The average per capita income was to reach $800 per year. Annual targets in 2000 included coal capacity, 1.2 billion tons; steel, 70 million tons; power generation, 20 million kilowatts; grain, 460 million tons; and textiles, 8.25 million tons. The targets appear to be ambitious. However, based on China's past economic growth of 8.1% from 1953 to 1981, the State Council felt that the goals of its long-term economic plan were achievable.[3]

In December 1982, a constitution was adopted for the People's Republic of China. Article 9 of chapter 1 defined ownership of mineral resources and other natural resources, and article 18, the rights of foreign enterprises operating within China. Chapter 2 dealt with the rights and duties of the citizenry; chapter 3, with the structure of the Government; and chapter 4, with the national flag, emblem, and capital.

In a departure from 30 years of a closed-door policy, the Government was encouraging foreign capital, technology, and ventures to assist its modernization drive. On February 17, the State Council approved a 50-article income tax law concerning foreign enterprises. Included in the articles were definitions for types of venture, taxation schedule, and provisions for expenditures and depreciation of fixed assets. Because of lack of experience, the law was purposefully skeletal and would develop organismically as specific situations arose.

On August 23, a trademark law was adopted. Up to June 30, about 63,000 Chinese trademarks and 9,900 foreign trademarks were registered in China. The new law was to provide provisions for the protection of exclusive use of trademarks, duration, and to update and facilitate registration. Foreign trademark registrations were subject to two conditions. The applicant's country must have a reciprocal trademark agreement with China, and the trademark must have prior registration in the country of origin.[4]

Furthermore, the State Economic Commission, State Scientific and Technological Commission, and the State Bureau of Standardization began supervising industry's adoption of international standards. To become competitive in the world market, China realized the common trend of technical and economic development by using international standards. The Bureau of Standardization had national standards for 4,462 products. In 1982, national standards were set for 1,054 products, of which 400 conformed to international standards.[5]

On February 10, China promulgated regulations on the exploration of offshore petroleum resources in cooperation with foreign companies.[6] The provisions include defining the rights and obligations of the parties to petroleum contracts, taxation, production sharing, and ownership of data. China National Offshore Oil Co. was established to direct and oversee all aspects of offshore oil development. Letters of notification were extended to 46 companies in 12 countries inviting bids for offshore exploration, and 33 companies tendered bids for a total area of 150,000 square kilometers.

China began drafting regulations for its first marine environmental protection law, which was to become effective on March 1,

1983. Stipulations in the law will cover five areas: pollution and damage of coastal projects, offshore petroleum exploration, land-originating pollutants, boats and ships, and dumping of wastes. The law is applicable to all foreign vessels and companies operating within China's territorial waters.

According to the Ministry of Urban and Rural Construction and Environmental Protection, China's program for environmental protection would shift from abatement to prevention. By 1985, the Government was to require operation of pollution-controlled facilities for all new construction projects. Of the 44 chemical and metallurgical projects opened in 1982, 42 operated new antipollution facilities. Environmental impact statements had been completed for 20 projects and 41 more were underway, including impact statements for the Baoshan iron and steel complex in Shanghai, China's first nuclear powerplant in Zhejiang, a copper-producing center in Jiangxi, and a coal-producing center in Shanxi.

According to the State Statistical Bureau, China's total industrial output value in 1982 was $292 billion, a 7.7% increase over that of 1981, which exceeded the planned increase of 4%.[7] The 1982 targets for output of coal, electricity, rolled steel, cement, chemical fertilizers, and sulfuric acid were exceeded. State revenue was estimated at $59 billion, and expenditures, $60 billion. Investment for capital construction reached $29 billion, and for fixed assets, $45 billion. Total foreign trade in 1982 reached $41 billion.

For more efficient planning, the State Statistical Bureau was to conduct a statistical analysis of the industrial production of 40 cities including Anshan, Baotou, Beijing, Chengdu, Dalian, Fushun, Guangzhou, Harbin, Kunming, Nanjing, Shenyang, Tangshan, and Wuhan. These 40 key cities account for 50% of the total national industrial output. Fifteen of the key cities account for 7.8% of the total population, 25% of the nation's industrial fixed assets, 37.1% of the gross value of industrial output, 42.6% of the tax profits, 36% of local revenue, and 18.7% of retail sales. It was reasoned that small investments in key cities would yield the fastest and largest economic return and that the key cities would be the model for reform of the overall industrial base.[8]

In 1982, the mammoth task of conducting a national census was undertaken. According to the State Statistical Bureau, the population of the 29 Provinces, municipalities, and autonomous regions of China totaled 1,008,175,288 on July 1, 1982. Males account for 51.5% and females for 48.5% of the population. In comparison with the second national census taken in 1964, the annual population growth rate averaged 2.1% during the past 18 years. Seven of the twenty-six Provinces and autonomous regions had populations of more than 50 million. The most populous Provinces were Sichuan (99,713,310), Henan (74,422,739), and Shandong (74,419,054).[9]

China was expected to ratify the proposed United Nations (U.N.) treaty on the Law of the Sea. During the third U.N. conference on the Law of the Sea held in Jamaica in early December, the chairman of the Chinese delegation stated reservations concerning the treaty but that the new convention lays down a number of important legal principles and a regime for safeguarding the sea as a common heritage of humankind.

According to the State Oceanography Bureau, China was to conduct a nationwide survey of resources in coastal zones and tidal flats, which was to be completed in 1986. The survey would involve such ministries and commissions as geology and minerals, petroleum, aquatic products, agriculture, and shipping. The area to be investigated stretches from the mouth of the Yalu River in the north to the mouth of the Peicang River in the south. Initial studies have begun in Guangdong, Jiangsu, Liaoning, Shandong, Shanghai, and Zhejiang.

One of the largest deterrents to China's modernization is the limited transportation system. During 1983-85, a total of 1,700 kilometers of new railways was to be built, 1,500 kilometers to be double tracked and 2,000 kilometers to be electrified. Most of the new lines will be in north, southwest, and east China to facilitate shipping mineral resources from these areas, especially coal from Shanxi Province. By 1985, the railways would be able to handle 1.2 billion tons of freight and 1.1 billion passengers per year. Under the sixth 5-year plan, 132 deepwater berths were to be constructed at 15 coastal sites, including Dalian, Huangpu, Lianyungang, Qingdao, Shanghai, and Tianjin. Fifty-four were to be operating by the end of 1985, which would increase loading capacity by 100 million to 317 million tons. Inland navigation was also to be upgraded. Alone, the overall transport capability of the Chang Jiang was to be raised from 47 million to 100 million tons. Also,

the Grand Canal from Hangzhou to Jining and the Nanning-Guangzhou section of the Xijiang River would be opened for navigation.[10]

As part of the modernization plan, China's investment priorities were to emphasize energy, construction materials, iron and steel, chemicals, machinery, light industry, agriculture, and tourism. On December 12, 1982, China announced 400 projects to be completed in 1981-85, which included expanding annual coal output capacity by 80 million tons; expanding total electric power generation by 12.9 million kilowatts, of which 3.2 million kilowatts is to be generated by hydropower; increase crude oil production by 35 million tons; double track and install new railways; construct deepwater berths to increase annual cargo handling capacity; construct 25 cement plants, which would increase national output by 12.4 million tons; complete construction of the Baoshan iron and steel complex; install new capacity for salt processing of 1.03 million tons and increase capacity of existing salt fields by 1.48 million tons; and install new capacity for the chemical industry.[11]

In conjunction with the U.N. Industrial Development Organization, 130 projects were opened to foreign companies for capital investment and introduction of new technology. Terms for investments were to be highly flexible, ranging from joint ventures and cooperative production-compensatory trade to other agreements satisfactory to the parties involved. Among the 130 projects, 5 were for newly established enterprises; the rest were aimed at revamping or expanding existing facilities. It was estimated that over $10 billion would be required to finance the programs with the energy and transport sectors receiving special attention.[12]

Late in 1982, a manufacturing, processing, and technology exhibition was held in Beijing to attract foreign interest for investment in China for long-term manufacturing rather than direct sales.

PRODUCTION

China's total value of industrial output rose by 8% to $292 billion, with heavy industry increasing by 10% and light industry by 6%. The increase in output by heavy industry was led by crude steel, rolled steel, soda ash, caustic soda, cement, and plate glass, which were up by 4% to 14%. According to the State Economic Commission, performance by the energy sectors was equally good. Coal production increased by close to 5% and electric power generation also increased about 6%. However, oil production remained static around the 1981 output level. The production target for nonferrous metals, aluminum, antimony, copper, lead, magnesium, mercury, nickel, tin, titanium, and zinc, was overfulfilled. Refined output of copper, tungsten, zinc, and 15 other metals increased 15.3%, and production of rare metals increased 6.3%.

China is well known as a traditional producer of such commodities as antimony, fluorspar, iron and steel, magnesite, mercury, tin, and tungsten. Moreover, China is becoming a significant source for barite, beryllium, ferroalloys, rare earths, titanium, and vanadium.

Table 1.—China: Estimated[1] production of mineral commodities[2]

(Metric tons unless otherwise specified)

Commodity[3]	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Bauxite, gross weight[4]	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Alumina, gross weight	750,000	750,000	750,000	750,000	750,000
Metal, refined, primary	360,000	360,000	360,000	360,000	360,000
Antimony, mine output, metal content	10,000	10,000	10,000	10,000	10,000
Bismuth, mine output, metal content	240	260	260	260	260
Cadmium metal, smelter	220	225	225	225	225
Copper:					
Mine output, metal content	200,000	200,000	200,000	200,000	200,000
Metal:					
Smelter, primary and secondary	200,000	200,000	200,000	200,000	200,000
Refined, primary and secondary	270,000	280,000	280,000	280,000	280,000
Gold, mine output, metal content—troy ounces	150,000	200,000	225,000	1,700,000	1,900,000
Iron and steel:					
Iron ore, gross weight[5]—thousand tons	70,000	75,000	75,000	75,000	75,000
Pig iron[6]—do	34,790	36,730	38,020	34,170	35,535
Ferroalloys—do	600	650	r1,000	940	880
Steel, crude[6]—do	31,780	34,430	37,120	35,600	37,118
Steel, rolled—do	22,080	24,970	27,160	26,700	29,008
Lead:					
Mine output, metal content	145,000	155,000	155,000	155,000	155,000
Metal, refined, primary and secondary	160,000	170,000	170,000	170,000	170,000
Magnesium metal, primary	6,000	6,000	7,000	7,000	7,000
Manganese ore, gross weight—thousand tons	1,300	1,500	1,600	1,600	1,600
Mercury, mine output, metal content—76-pound flasks	20,000	20,000	20,000	20,000	20,000
Molybdenum, mine output, metal content	2,000	2,000	2,000	2,000	2,000
Nickel:					
Mine	11,000	11,000	11,000	11,000	11,000
Smelter	10,000	10,000	10,000	10,000	10,000
Silver, mine output, metal content—thousand troy ounces	1,500	2,000	2,500	2,500	2,500
Tin:					
Mine output, metal content	14,000	14,000	14,600	15,000	15,000
Metal, smelter	14,000	14,000	14,600	15,000	15,000
Tungsten, mine output, metal content	11,500	13,100	15,000	13,500	12,500
Zinc:					
Mine output, metal content	160,000	160,000	160,000	160,000	160,000
Refined, primary and secondary	160,000	160,000	160,000	160,000	160,000
NONMETALS					
Asbestos	250,000	140,000	131,700	106,000	110,000
Barite	400,000	500,000	680,000	775,000	900,000
Cement, hydraulic[6]—thousand tons	65,240	73,900	79,860	84,000	94,072
Fluorspar	440,000	460,000	470,000	480,000	480,000
Graphite	80,000	182,000	160,000	184,000	185,000
Gypsum—thousand tons	1,500	3,567	3,348	3,428	3,400
Kyanite	2,000	2,500	2,500	2,500	2,500
Lithium minerals, all types	10,000	10,000	10,000	10,000	10,000
Magnesite—thousand tons	1,800	2,000	2,000	2,000	2,000
Nitrogen: N content of ammonia—do	7,637	8,821	9,990	9,860	10,257
Phosphate rock and apatite, P_2O_5 equivalent—do	1,033	1,817	2,310	2,510	2,708
Potash, marketable, K_2O equivalent—do	21	16	12	20	26
Pyrite, gross weight—do	3,600	3,700	3,800	5,900	4,100
Salt[6]—do	19,530	14,770	17,280	18,320	16,008
Sodium compounds: Sodium carbonate, natural and synthetic[6]—do	1,329	1,486	1,613	1,652	1,734
Sulfur:					
Native	200,000	200,000	200,000	200,000	200,000
Content of pyrite	1,605,000	1,682,000	1,700,000	1,800,000	1,800,000
Byproduct, all sources	350,000	400,000	400,000	400,000	400,000
Total	2,155,000	2,282,000	2,300,000	2,400,000	2,400,000
Talc and related materials	150,000	150,000	915,000	900,000	900,000

See footnotes at end of table.

Table 1.—China: Estimated[1] production of mineral commodities[2] —Continued

(Metric tons unless otherwise specified)

Commodity[3]	1978	1979	1980	1981	1982[p]
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite ____ thousand tons	63,000	65,000	60,000	60,000	61,000
Bituminous and lignite ____ do	555,000	570,000	560,000	560,000	590,000
Total[6] ____ do	618,000	635,000	620,000	620,000	651,000
Coke, all types[6] ____ do	32,375	33,540	34,050	31,720	33,245
Gas, natural:					
Gross ____ billion cubic feet	535	565	555	495	455
Marketed[6] ____ do	485	512	504	450	414
Petroleum and refinery products:					
Crude (including crude from oil shale) thousand 42-gallon barrels[6]	760,000	775,000	773,435	738,906	744,994
Refinery products ____ do	600,000	470,000	470,000	450,000	450,000

[p]Preliminary. [r]Revised.

[1]Except data specifically footnoted as reported.

[2]Table includes data available through July 31, 1983.

[3]In addition to the commodities listed for which quantitative estimates of output have been made, China is known or believed to have produced the following commodities for which no estimates have been prepared, owing to a paucity of general information upon which to base an estimate: arsenic, chromite, titanium minerals, uranium, boron minerals, various clays (including kaolin), feldspar, lime, mica, sand, various industrial and dimension stones, and carbon black. Other unlisted commodities also may be produced.

[4]Diasporic bauxite; includes an estimated 165,000 metric tons per year of production for refractory applications.

[5]In terms of 50% Fe ore.

[6]Reported data.

TRADE

China's foreign trade totaled $41 billion in 1982. Exports were $22 billion, a 7% increase over shipments in 1981. Imports were $19 billion, down about 3% from receipts in 1981. China's major trading partners were Japan, the United States, the European Economic Community, and the Association of Southeast Asian Nations, in that order. In addition, a large but indeterminate volume of China's external trade is conducted through Xianggang (Hong Kong). To expand trade, China has negotiated preferential tariff agreements with Australia, Canada, the European Economic Community, Japan, New Zealand, and the United States.[13]

Over the past 30 years, capital goods accounted for about 80% of the total value of imports. For exports, however, the configuration by types of goods has changed. Apart from increasing exports of traditional agricultural and associated products, China has made efforts to export manufactured goods, with most of the increases made in textiles and light industrial products. In 1973, exports of crude oil started, and shipments of heavy industrial products began to expand. Since 1953, the share of agricultural products of total exports fell from 55.7% to 23.1%; textiles and light industrial products rose from 26.9% to 45%; and heavy industrial products increased from 17.4% to 31.9%.[14]

Beginning in early 1979, there was a reversal of economic priorities shifting import emphasis from costly heavy industrial equipment to energy, infrastructure, and light industry. Undoubtedly, an important factor underlying the change was dwindling foreign exchange reserves. Despite cutbacks in steel purchases and cessation of negotiations for new plants and equipment, imports rose during 1980-81 owing in part to contracts in 1978 for subsequent deliveries of whole-plant purchases. By 1981-82, imports fell 6% as a result of limiting further expenditures for foreign services, goods, and technology.[15]

In July 1979, the Government designated Shantou, Shenzhen, and Zhuhai in Guangdong and Xiamen in Fujian as special economic zones. In turn, Guangdong was to treat Hainan Dao as a free-trade zone to promote the development of resources on the island. In addition, under the sixth 5-year plan, two major economic zones were to be built. The Chang Jiang Delta economic zone will center on Shanghai, China's largest industrial city. The other, to be in Shanxi, will concentrate on the develop-

ment of coal, chemicals, and other heavy industry in the western part of Nei Monggol, northern Shanxi, all of Ningxia, and western Henan.

China exports a wide range of mineral products from crude ore to refined materials. In addition to its traditional exports of antimony, fluorspar, graphite, magnesite, mercury, and tungsten, China exports cement, coal, crude oil, and petroleum refinery products. There were also increasingly significant exports of barite, bauxite, ferroalloys, rare earths, salt, talc, tin, and titanium.

Table 2.—China: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium:				
Oxides and hydroxides	--	231	--	France 142; Netherlands 75.
Metal including alloys, all forms	--	1	--	All to Japan.
Rare-earth metals	--	1,087	--	Japan 1,081.
Unspecified	31	37	13	Indonesia 10; Japan 9.
Aluminum:				
Ore and concentrate	451,667	446,830	176,485	Italy 81,747; West Germany 58,025; Japan 38,616.
Oxides and hydroxides	33,078	30,406	--	Finland 9,216; Thailand 7,383; Singapore 5,270.
Metal including alloys:				
Scrap	11	--		
Unwrought	5,930	[2]26,885	--	Hong Kong 20,202; Thailand 1,988.
Semimanufactures	5,690	884	1	Indonesia 654; Jordan 140.
Antimony:				
Ore and concentrate	3,920	3,438	--	Yugoslavia 2,516; Japan 749.
Metal including alloys, all forms	2,460	2,723	160	Japan 2,253; France 185.
Beryllium:				
Ore and concentrate	782	--		
Oxides and hydroxides	--	1	--	All to Japan.
Bismuth: Metal including alloys, all forms	--	10	--	All to West Germany.
Cadmium: Metal including alloys, all forms	226	326	--	West Germany 211; Belgium-Luxembourg 50; Czechoslovakia 40.
Chromium:				
Ore and concentrate	2,057	7,910	--	All to Japan.
Oxides and hydroxides	692	1,163	277	France 441; Finland 174; Hong Kong 158.
Metal including alloys, all forms	137	5	--	All to Sweden.
Cobalt:				
Oxides and hydroxides:				
Quantity, reported	32	44	--	Japan 19; West Germany 17.
Value only, reported thousands	$16	$8	--	France $6; Indonesia $2.
Metal including alloys, all forms	5	--		
Columbium and tantalum:				
Ore and concentrate	14	--		
Ash and residue containing columbium and/or tantalum	--	478	--	All to West Germany.
Metal including alloys, all forms, tantalum value, thousands	--	$23	$20	West Germany $3.
Copper:				
Ore and concentrate	48	--		
Sulfate	409	2,247	--	Austria 2,000.
Metal including alloys:				
Scrap	2,888	4	--	All to Japan.
Unwrought	58	[2]8,051	2	Hong Kong 6,815; Japan 1,014.
Semimanufactures	3,999	516	--	Pakistan 172; Indonesia 159; Thailand 88.
Germanium: Metal including alloys, all forms	61	3	--	Mainly to Japan.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	--	1,029	--	All to Hong Kong.
Indium: Metal including alloys, all forms kilograms	--	21	--	All to Japan.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	254	--	--	
Pyrite, roasted	--	10	--	All to West Germany.
Metal:				
Scrap	10,161	146,113	--	Japan 74,418; Hong Kong 57,973.
Pig iron, cast iron, related materials	260,575	861,928	--	Japan 794,041; Hong Kong 23,562.
Ferroalloys:				
Ferromanganese	--	48,675	5	Pakistan 48,383.
Ferromolybdenum	--	72	--	West Germany 30; Sweden 27.
Ferrosilicon	--	1,314	--	All to Thailand.
Unspecified	2,900	86,697	2,776	Japan 80,754; Pakistan 2,058.
Steel, primary forms	35,919	136,381	4	Philippines 89,613; Pakistan 25,446; Thailand 10,282.
Semimanufactures:				
Bars, rods, angles, shapes, sections	207,320	56,112	1	Pakistan 21,303; Thailand 14,361; United Arab Emirates 4,269.
Universals, plates, sheets	38,071	13,915	--	Philippines 4,932; Indonesia 3,200; Jordan 2,568.
Hoop and strip	617	735	--	Pakistan 327; Thailand 294.
Rails and accessories	1,088	92	--	All to Tunisia.
Wire[3]	34,574	18,043	--	Egypt 6,020; Pakistan 3,742; United Arab Emirates 3,129.
Tubes, pipes, fittings:				
Quantity, reported	84,694	13,663	130	Qatar 4,933; Philippines 3,794; United Arab Emirates 2,124.
Value only, reported thousands	$295	$301	--	Australia $159; Trinidad and Tobago $68; Malta $66.
Castings and forgings, rough	3,163	2,341	--	Indonesia 1,342; West Germany 613; Australia 175.
Lead:				
Oxides	478	662	--	Japan 325; Egypt 160; Indonesia 115.
Metal including alloys:				
Unwrought	731	2,512	101	Japan 1,745; Thailand 455.
Semimanufactures	20	668	--	Indonesia 664.
Magnesium: Metal including alloys:				
Unwrought	--	445	93	West Germany 142; Belgium-Luxembourg 120.
Semimanufactures	--	35	--	All to United Kingdom.
Manganese:				
Ore and concentrate	24,544	22,210	--	Japan 19,616; West Germany 1,494.
Oxides	3,547	989	--	France 380; Indonesia 186; Thailand 115.
Metal including alloys, all forms	437	571	18	Canada 224; West Germany 213.
Mercury 76-pound flasks	10,327	10,063	812	West Germany 3,597; France 812; Australia 783.
Metalloids:				
Arsenic:				
Ore and concentrate	1	20	--	All to Japan.
Oxides and acids	3	74	--	All to Hong Kong.
Phosphorus	NA	2,603	--	Japan 2,600.
Silicon	NA	9,722	--	All to Japan.
Unspecified	1,832	[4]668	137	Australia 369; West Germany 93; Finland 50.
Molybdenum:				
Ore and concentrate	330	369	--	Sweden 297; France 65.
Oxides and hydroxides	NA	100	--	Mainly to West Germany.
Metal including alloys, all forms	65	69	26	Japan 19; United Kingdom 19.
Nickel:				
Matte and speiss	2	--		
Metal including alloys, all forms	11	8	--	Indonesia 4; Thailand 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$958	$1,976	$1,465	West Germany $511.
Silver:				
Waste and sweepings[5] do	$211	$148	--	France $147.
Metal including alloys, unwrought and partly wrought do	$10,940	$3,441	$254	France $3,086; Indonesia $96.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Tin:				
Oxides	29	--		
Metal including alloys:				
Scrap	3,000	6	--	All to Australia.
Unwrought	3,268	5,462	2,032	Australia 2,149; France 303.
Semimanufactures	97	97	(6)	Mainly to Thailand.
Titanium:				
Oxides	1,659	1,779	57	United Kingdom 420; France 377; Italy 124.
Metal including alloys, all forms	1,412	15	--	France 10.
Tungsten:				
Ore and concentrate	6,207	6,058	2,243	West Germany 894; Poland 806; Sweden 579.
Oxides and hydroxides	--	22	--	Belgium-Luxembourg 12; France 5; West Germany 5.
Metal including alloys, all forms:				
Quantity, reported	23	246	14	Japan 232.
Value only, reported thousands	$26	$14	--	France $9; Denmark $5.
Uranium and/or thorium:				
Ore and concentrate value, thousands	--	$58	--	All to France.
Metal including alloys, all forms do	--	$115	--	All to Indonesia.
Vanadium:				
Oxides and hydroxides	--	1,873	--	Japan 857; West Germany 474; Belgium-Luxembourg 394.
Ash and residue containing vanadium	--	4,944	--	All to West Germany.
Zinc:				
Ore and concentrate	3	--		
Oxides	928	1,339	31	Japan 429; Thailand 200; Indonesia 186.
Blue powder	9	--		
Metal including alloys:				
Scrap	30	--		
Unwrought	10,324	9,398	1,492	Thailand 3,576; Japan 3,181; Pakistan 625.
Semimanufactures	221	57	--	Liberia 17; Pakistan 16; Philippines 16.
Other:				
Ores and concentrates	5,290	6,278	932	Thailand 3,580; Greece 1,001; Indonesia 454.
Oxides and hydroxides	13,334	8,365	2,040	Pakistan 2,509; Austria 1,917; Japan 662.
Ashes and residues	1,336	11,886	5,823	Austria 6,001.
Pyrophoric alloys	--	55	--	Thailand 50; United Arab Emirates 5.
Base metals including alloys, all forms:				
Quantity, reported	1,602	387	--	Indonesia 92; United Kingdom 72; Pakistan 39.
Value only, reported thousands	$252	$18,013	$17,864	Australia $148.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,068	521	--	Japan 357; Philippines 157.
Artificial:				
Corundum	3,157	7,119	288	Japan 4,908; West Germany 1,532; Italy 130.
Silicon carbide	--	85	--	All to West Germany.
Dust and powder of precious and semiprecious stones value, thousands	$6	$6	--	All to Thailand.
Grinding and polishing wheels and stones:				
Quantity, reported	3,285	1,372	--	Indonesia 943; Pakistan 203; Philippines 123.
Value only, reported thousands	$24	$340	$55	Fiji $273.
Asbestos, crude	7,597	3,642	--	Indonesia 3,448.
Barite and witherite	617,277	797,722	677,439	Japan 40,617; West Germany 26,494.
Boron materials:				
Crude natural borates	4	--		
Oxides and acids	1,320	2,378	--	Japan 1,133; West Germany 360; Australia 225.
Cement:				
Quantity, reported	874,044	112	--	Togo 69; Philippines 25.
Value only, reported thousands	$8	$10	--	All to Australia.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Chalk	50	41	--	Ireland 40.
Clays and clay products:				
Crude:				
Bentonite	NA	580	--	All to Thailand.
Chamotte earth	NA	2,452	--	West Germany 2,232; Netherlands 220.
Fire clay	NA	4,329	--	All to West Germany.
Kaolin	NA	10,929	--	Japan 9,996; West Germany 760.
Unspecified	204,189	23,915	2	Italy 10,561; Pakistan 7,863; United Kingdom 2,491.
Products:				
Nonrefractory:				
Quantity, reported	38,390	3,053	--	Jordan 2,264; Pakistan 244.
Value only, reported thousands	$7,897	$899	--	Brunei $674; Australia $152.
Refractory including nonclay brick:				
Quantity, reported	8,642	3,953	--	Indonesia 1,371; Pakistan 354; Jordan 289.
Value only, reported thousands	$2,345	$916	--	Philippines $897; Australia $14.
Cryolite and chiolite	5,194	760	750	Argentina 10.
Diamond:				
Gem, not set or strung value, thousands	$5,829	$19,882	$38	Japan $15,006; Belgium-Luxembourg $3,243.
Industrial do	$65,175	$983	$3	Belgium-Luxembourg $980.
Diatomite and other infusorial earth	145	20	--	Mainly to Australia.
Feldspar, fluorspar, related materials:				
Feldspar	NA	2,835	--	Japan 2,785; Thailand 50.
Fluorspar	NA	297,587	--	Japan 257,701; West Germany 36,571.
Unspecified	359,308	61,638	23,228	Australia 17,721; Egypt 6,962; Indonesia 4,812.
Fertilizer materials: Manufactured:				
Ammonia	253	--	--	
Nitrogenous	479	109	--	Philippines 56; Australia 53.
Phosphatic	100	4,230	--	All to Japan.
Potassic	225	--	--	
Unspecified and mixed	NA	753	--	All to Japan.
Graphite, natural	37,824	43,598	5,968	Japan 21,645; West Germany 9,588; United Kingdom 2,140.
Gypsum and plaster	4,310	785	--	Indonesia 498; Japan 129.
Halogens:				
Quantity, reported	17	--	--	
Value only, reported thousands	$2	$5	--	All to West Germany.
Lime	27,510	43	--	All to Indonesia.
Magnesium compounds:				
Magnesite	211,826	110,853	--	Japan 76,087; West Germany 28,121; Netherlands 6,085.
Oxides and hydroxides	NA	457	--	All to Japan.
Other	NA	93,897	2,258	West Germany 14,338; Yugoslavia 12,750; Netherlands 12,546.
Mica:				
Crude including splittings and waste	10,867	9,783	1	United Kingdom 6,869; Japan 1,084; West Germany 1,076.
Worked including agglomerated splittings	30	82	(6)	West Germany 55; France 19.
Phosphates, crude	1,234	--		
Pigments, mineral:				
Natural, crude	1,340	2,578	--	All to Japan.
Iron oxides and hydroxides, processed	2,457	1,520	--	Indonesia 954; Egypt 460.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$3,473	$10,893	$350	Japan $5,193; Canada $5,134.
Synthetic do	$54	$28	--	Netherlands $21.
Pyrite, unroasted kilograms	868,078	50	--	All to Thailand.
Salt and brine		560,062	--	Japan 554,334.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	312	215	--	Philippines 147; Australia 62.
Sodium carbonate, natural and manufactured	6,354	12,028	--	West Germany 11,811.
Sodium hydroxide	7,272	6,121	--	Indonesia 5,214; Thailand 550.
Sodium sulfate, natural and manufactured	--	241	--	All to Thailand.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	67,437	[7]58,911	106	Japan 55,269; Australia 2,144.
Worked:				
Quantity, reported	18,097	6,812	--	Japan 5,488; Togo 382; Jordan 291.
Value only, reported thousands	$1,256	$1,085	$1,048	Australia $33.
Gravel and crushed rock	12,927	2,400	--	Japan 1,819; Thailand 280; Trinidad and Tobago 193.
Limestone other than dimension	130,485	18	--	Thailand 13; Sri Lanka 5.
Quartz and quartzite	37,454	33,511	--	Japan 33,457.
Sand other than metal-bearing	1,208	3,052	--	Japan 3,040.
Sulfur:				
Elemental:				
Crude including native and byproduct	90	180	--	Pakistan 160; Indonesia 20.
Colloidal, precipitated, sublimed	NA	1,050	--	Indonesia 1,000; Sri Lanka 50.
Sulfuric acid	943	(6)	--	All to Thailand.
Talc, steatite, soapstone, pyrophyllite	382,867	348,941	456	Japan 323,416; Indonesia 8,669; Thailand 5,330.
Vermiculite	NA	115	--	All to Spain.
Other:				
Crude	16,612	[8]9,147	--	Japan 3,223; Indonesia 2,425; Pakistan 872.
Slag and dross, not metal-bearing	12,440	4,132	--	All to Japan.
Oxides and hydroxides of barium, magnesium, strontium	2,113	456	73	Canada 102; Denmark 50; Finland 50; Thailand 40.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	1,359	--	Indonesia 995; Oman 160; Thailand 156.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	5,519	5,948	--	Indonesia 5,478; Japan 465.
Carbon: Carbon black	3,003	5,459	--	Thailand 3,344; Indonesia 1,533.
Coal:				
Anthracite and bituminous thousand tons	2,795	2,555	--	Japan 2,349; West Germany 155.
Briquets of anthracite and bituminous coal	NA	4,000	--	All to Thailand.
Lignite including briquets	1,351	800	--	Japan 797.
Coke and semicoke	31,543	19,618	--	Japan 7,904; Thailand 6,908; Indonesia 3,806.
Hydrogen, helium, rare gases	(9)	28	--	Italy 15; Guatemala 8.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	78,827	71,519	--	Japan 64,714; Philippines 4,286; Thailand 2,519.
Refinery products:				
Liquefied petroleum gas do	26	(6)	--	All to Liberia.
Gasoline do	11,057	14,303	7,164	Japan 5,796; Belgium-Luxembourg 476; Netherlands 466.
Mineral jelly and wax do	506	868	(6)	Thailand 468; Pakistan 275; Philippines 59.
Kerosine and jet fuel do	2,830	1,078	--	Mainly to Japan.
Distillate fuel oil do	10,813	3,748	--	Japan 2,428; Thailand 1,180; Australia 138.
Lubricants do	[10]186	165	--	Thailand 96; Indonesia 65.
Nonlubricating oils do	48	5	--	Mainly to Thailand.
Residual fuel oil do	2,375	488	--	Japan 324; Australia 164.
Bitumen and other residues do	1	19	--	All to Indonesia.
Bituminous mixtures do	22	1	--	Mainly to Philippines.
Petroleum coke do	1,265	891	--	All to Japan.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Tars and other crude chemicals derived from coal, gas, and petroleum:				
Quantity, reported	92,832	78,087	--	Japan 77,165; Philippines 650.
Value only, reported thousands	--	$320	--	All to Australia.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the partner trade countries.

[2]Includes semimanufactures exported to Hong Kong.

[3]Excludes unreported quantity exported to Malta valued at $44,000 in 1980 and $29,000 in 1981.

[4]Excludes unreported quantity exported to Italy valued at $10,000.

[5]May include platinum-group metals.

[6]Less than 1/2 unit.

[7]Excludes unreported quantity exported to Trinidad and Tobago valued at $61,000.

[8]Excludes unreported quantity exported to Canada valued at $24,000.

[9]Unreported quantity valued at $23,000.

[10]Excludes unreported quantity valued at $137,000.

Table 3.—China: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	4	1	--	All from United Kingdom.
Aluminum:				
Oxides and hydroxides	95	10	--	Mainly from Japan.
Metal including alloys:				
Scrap	480	--		
Unwrought	66,937	26,808	3,901	New Zealand 9,998; France 6,904; Norway 2,499.
Semimanufactures	12,675	14,690	30	Japan 13,618; Netherlands 517.
Chromium:				
Ore and concentrate	34,405	48,605	--	All from Philippines.
Oxides and hydroxides	2,756	86	50	Japan 36.
Cobalt:				
Oxides and hydroxides kilograms	1,000	50	--	All from Japan.
Metal including alloys, all forms do	454	--		
Columbium and tantalum: Metal including alloys, all forms, tantalum do	103	7	--	All from Japan.
Copper:				
Ore and concentrate, copper content	54,782	30,995	--	Peru 19,435; Philippines 8,599; Papua New Guinea 2,961.
Sulfate	7,539	--		
Metal including alloys:				
Scrap	188	1,193	138	Japan 1,055.
Unwrought	92,213	35,138	--	Peru 19,239; Chile 9,900; Zambia 5,999.
Semimanufactures	1,623	516	34	Japan 313; France 100.
Iron and steel:				
Iron ore and concentrate thousand tons	5,949	1,831	--	All from Australia.
Metal:				
Scrap	1,932	159	159	
Pig iron, cast iron, related materials	230,712	75	--	Japan 45; Argentina 30.
Ferroalloys:				
Ferromanganese	--	100	--	All from Japan.
Unspecified	1,022	1,180	--	Mainly from Japan.
Steel, primary forms	132,534	156,849	--	Japan 156,846.

See footnotes at end of table.

Table 3.—China: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	2,041	642	15	Japan 398; Poland 48; Argentina 30.
Universals, plates, sheets:				
Quantity, reported thousand tons	1,532	1,509	--	Japan 1,350; West Germany 85.
Value only, reported thousands	$28,364	$12,154	--	Australia $12,152.
Hoop and strip:				
Quantity, reported thousand tons	185,972	119,194	1	Japan 101,751.
Value only, reported thousands	$6,074	--		
Rails and accessories	2,355	249	--	Mainly from Japan.
Wire	7,793	3,834	(2)	Japan 2,601; Spain 412; Sweden 285.
Tubes, pipes, fittings thousand tons	710	268	(2)	Japan 212; Argentina 13; Thailand 13.
Castings and forgings, rough	97	330	--	Mainly from Japan.
Lead:				
Ore and concentrate, lead content	8	--		
Oxides	3,126	1,381	--	Australia 1,377.
Metal including alloys:				
Scrap	134	--		
Unwrought	26,648	27,539	--	Australia 17,492; Peru 7,900.
Semimanufactures	4	21	--	All from West Germany.
Magnesium: Metal including alloys:				
Unwrought	4,648	3	--	All from France.
Semimanufactures	1	--		
Manganese: Oxides	108	285	93	Japan 192.
Mercury value	NA	$462	--	All from Japan.
Metalloids	254	867	--	France 864.
Molybdenum: Metal including alloys, all forms kilograms	130	50	(2)	Mainly from Japan.
Nickel: Metal including alloys, all forms	107	[3]14	(2)	Japan 8; West Germany 5.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,259	$482	--	United Kingdom $212; West Germany $171; Japan $99.
Silver:				
Ore and concentrate[4] do	$197	$3,453	$107	Philippines $3,346.
Metal including alloys, unwrought and partly wrought do	$13	$112	$53	West Germany $45.
Tin:				
Ore and concentrate	35	--		
Metal including alloys:				
Scrap	356	--		
Unwrought	1	12	--	All from Japan.
Semimanufactures	17	[5]268	268	
Titanium:				
Oxides	2,954	5,340	709	Japan 3,871; Belgium-Luxembourg 760.
Metal including alloys, all forms	2	(2)	--	All from Japan.
Tungsten: Metal including alloys, all forms kilograms	193	585	(2)	Mainly from Japan.
Uranium and/or thorium: Ore and concentrate value, thousands	--	$89	$89	
Zinc:				
Oxides	4	--		
Metal including alloys:				
Scrap	2	--		
Unwrought	400	12,896	--	Peru 6,634; Japan 4,945.
Semimanufactures	13	--		
Other:				
Ores and concentrates value, thousands	$331	$5	--	All from Australia.
Oxides and hydroxides	24	33	--	Japan 28; West Germany 5.
Ashes and residues	520	[6]34	NA	New Zealand 34.
Base metals including alloys, all forms	12	46	44	NA.

See footnotes at end of table.

Table 3.—China: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1	53	3	Italy 50.
Artificial: Corundum	2	176	--	Mainly from West Germany.
Dust and powder of precious and semiprecious stones, excluding diamond value, thousands	$2	$42	$21	Belgium-Luxembourg $19.
Grinding and polishing wheels and stones	113	r17	(2)	Japan 12.
Asbestos, crude	719	68	--	Mainly from Japan.
Boron materials: Oxides and acids	452	2	2	
Cement	29,551	792	4	Japan 788.
Clays and clay products:				
Crude	964	596	71	Japan 525.
Products:				
Nonrefractory	292	224	--	Japan 128; Italy 96.
Refractory including nonclay brick	47,576	81,902	38	Japan 81,475; West Germany 256.
Diamond:				
Gem, not set or strung value, thousands	$7,312	$2,501	--	United Kingdom $1,595; Belgium-Luxembourg $881.
Industrial do	$13,834	$6,762	--	Belgium-Luxembourg $6,308; United Kingdom $451.
Diatomite and other infusorial earth	104	21	--	All from Japan.
Feldspar, fluorspar, related materials	2,121	--		
Fertilizer materials: Manufactured:				
Ammonia	10,132	1,130	--	All from Japan.
Nitrogenous thousand tons	2,142	1,588	110	Japan 950; Italy 176; Netherlands 118.
Phosphatic	238,581	230,438	202,906	Senegal 14,047.
Potassic	402,024	369,767	--	France 307,310; West Germany 39,549.
Unspecified and mixed:				
Quantity, reported	257,327	546,555	363,938	Italy 53,380; Belgium-Luxembourg 41,895; Greece 40,500.
Value only, reported thousands	--	$8,330	--	All from Netherlands.
Gypsum and plaster	16	33	33	
Magnesium compounds:				
Magnesite	127	3	--	All from West Germany.
Oxides and hydroxides	--	80	--	All from Japan.
Mica:				
Crude including splittings and waste	27	18	--	Do.
Worked including agglomerated splittings kilograms	502	NA	(3)	
Nitrates, crude	10,000	--		
Phosphates, crude	414,382	259,661	--	Morocco 156,289; Jordan 62,200; Egypt 27,287.
Pigments, mineral: Iron oxides and hydroxides, processed	1	1	--	Mainly from United Kingdom.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$3,830	$993	--	Sri Lanka $578; West Germany $267; Thailand $143.
Synthetic do	$9	$28	--	Japan $20; West Germany $6.
Salt and brine	90	220	207	Japan 10.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,588	202	1	Japan 201.
Sodium carbonate, natural and manufactured	76,422	6,783	--	Poland 4,123; United Kingdom 1,810.
Sodium hydroxide	122,637	58,907	272	Netherlands 47,833; France 9,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	35	36	--	All from Italy.
Worked	25	37	(2)	Italy 36.
Gravel and crushed rock	99	4	--	All from West Germany.
Quartz and quartzite	205	1	--	All from Japan.
Sand other than metal-bearing	6	148	--	Japan 100; West Germany 48.
Sulfur:				
Elemental, crude including native and byproduct	347,195	2,100	--	All from Japan.
Sulfuric acid	111	5,763	--	Japan 5,759.

See footnotes at end of table.

Table 3.—China: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Other:				
Crude	13,454	8	--	All from Japan.
Oxides and hydroxides of barium, magnesium, strontium	20	8	--	Do.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	--	6	NA	Belgium-Luxembourg 5.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	5,239	70	23	Japan 47.
Coal:				
Anthracite and bituminous	NA	113,678	58,503	Australia 55,174.
Lignite including briquets	50	--		
Coke and semicoke	--	1	--	All from Japan.
Hydrogen, helium, rare gases	1	(2)	--	Mainly from Japan.
Peat including briquets and litter	1	--		
Petroleum refinery products:				
Liquefied petroleum gas value, thousands	NA	$7	$3	Japan $2.
Gasoline 42-gallon barrels	5,925	13,958	--	Belgium-Luxembourg 12,928.
Mineral jelly and wax do.	283	236	55	Netherlands 157; Japan 24.
Kerosine and jet fuel do.	9,866	11,965	--	Yugoslavia 10,625; Thailand 1,340.
Distillate fuel oil do.	10,899	1,783	--	All from Yugoslavia.
Lubricants do.	37,337	18,026	(9)	Japan 7,586; United Kingdom 7,224.
Residual fuel oil do.	319,520	NA		
Bitumen and other residues do.	1,073	6	--	All from Japan.
Bituminous mixtures do.	145	145	--	Japan 139.
Petroleum coke do.	1,634	NA		
Unspecified do.	--	1,459	--	All from Japan.
Tars and other crude chemicals derived from coal, gas, and petroleum	150	308	8	West Germany 300.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of the country's mineral imports. These data have been compiled from United Nations information and data published by the partner trade countries.

[2]Less than 1/2 unit.

[3]Excludes unreported quantity valued at $49,000, of which $47,000 was from Japan.

[4]May include platinum-group metals.

[5]Excludes unreported quantity from West Germany valued at $3,000.

[6]Excludes unreported quantity from the United States valued at $107,000.

[7]Excludes unreported quantity valued at $44,000, of which $27,000 was from Belgium-Luxembourg.

[8]Unreported quantity valued at $59,000.

[9]Unreported quantity valued at $412,000.

COMMODITY REVIEW

China's largest metals sector is iron and steel. China's nonferrous sector is comprised of 10 metals, and output of these metals collectively was about 1 million tons. China's other metal sectors include precious metals (gold and silver), rare-earth metals, and rare metals (beryllium, columbium (niobium), molybdenum, tungsten, etc.). In regard to nonmetals, China is a large producer of barite, cement, fluorspar, magnesite, salt, and talc. The Ministry of Geology and Minerals continued to direct and coordinate exploration to delineate China's mineral resources. According to the Ministry, prospecting goals for 25 metal and nonmetal mineral reserves—including iron, phosphorus, uranium, coal, oil, and natural gas—were overfulfilled in 1982. Moreover, the newly discovered reserves of antimony, barite, gold, graphite, lead, marble, silver, and sulfur were the largest reported in the past 3 years. In fact, 13 times as much copper and 3 times as much silver was discovered as compared to the target for the year. Further, the proven reserves of silver deposits in China rank third in the world compared to sixth in the past.[16]

The search for energy resources has top priority for the next 3 years. During the second round of the national survey for oil and gas, coal prospecting will be accelerated in Nei Monggol, Heilongjiang, Henan, Guizhou, Sichuan, and Yunnan. An extensive survey of coalfields is also scheduled, focusing on eastern China. Past geologic exploration (1980-82) had been fruitful. The major finds included high-yielding oil wells in Zhuijiang Kou and large reserves of unspec-

ified nonmetallic minerals in east China.[17]

The Ministry of Metallurgical Industry was encouraging foreign investments to import technology to develop China's nonferrous metals. The present production level of this sector was far short of the needs of the national economy.[18] Under the current economic plan, total annual output of 10 nonferrous metals was to reach only 1.5 million tons in 1985. According to the Ministry of Metallurgical Industry, China's reserves of antimony, rare earths, tantalum, tin, titanium, tungsten, and zinc rank first in the world, while reserves of columbium, lead, mercury, molybdenum, and nickel rank second; copper, fourth; and aluminum, sixth.

METALS

Aluminum.—China's newest alumina-aluminum facility at Guiyang, Guizhou, constructed by Nippon Light Metal Co., began trial operations in December 1981. The installation includes an 80,000-ton-per-year aluminum refinery and a 200,000-ton-per-year alumina plant. Construction began in the fall of 1980, and final delivery of equipment for the alumina plant was completed late in 1982. During 1982, about 25,000 tons of metal was produced. Because of delays in equipment delivery and operational difficulties at the alumina plant, full operation of the refinery was not expected until mid-1983. When fully operational, the Guiyang plant will increase China's annual aluminum metal output by 20%.

To increase nonferrous metal production, China proposed expansion of its aluminum sector and was seeking foreign cooperation for technology and assistance. One avenue of approach was to purchase used, surplus Japanese capacity in order to install a 600,000-ton-per-year alumina plant and a 200,000- to 300,000-ton-per-year aluminum refinery at Hejin, Shanxi. A Chinese study mission visited the Chiba smelter of Showa Light Metal Industries K.K. in November 1982. Construction of an aluminum refinery in Hebei and Tianjin was also under consideration. Guangxi was seeking foreign economic cooperation to build an 80,000-ton-per-year aluminum plant and a 200,000-ton-per-year alumina plant, and to develop a bauxite deposit at Pingguo.

On December 25, 1982, the Zhuoxian aluminum processing plant went into operation. Equipment for this plant, designed to produce 12,000 tons per year of aluminum foil, was imported from Japan and the United States. Nanping aluminum refinery has an annual aluminum capacity of 6,000 tons per year. Current processing includes 4,000 tons of ingot for export, 1,000 tons of wire, and 1,000 tons of sheet and pipe. Nanping was seeking foreign participation to install equipment to produce 4,000 tons per year of foil or to expand capacity to produce 13,000 tons per year of sheet, strip, and foil. In August, the Guangdong provincial government awarded a contract to Mass-Global Corp. (United States) to design and build an aluminum anodizing plant. Furthermore, an extrusion plant was subcontracted to Texas Hydraulic Corp. (United States). Completion of the project was scheduled for late 1983. The Hefei aluminum plant was to add an annual capacity of 3,000 tons of shaped aluminum or 5,500 tons of plate and foil.

China has large bauxite deposits located mainly in Guangxi (Pingguo), Guizhou (Huaxi, Wengan, Xiuyi), Fujian (Longyan), Hebei (Cixian and Tangshan), Henan (Baoshan and Huixian), Liaoning (Fuxian, Liaoyang, and Yanji), Sichuan (Leshan), and Yunnan (Kunming). Recent reported bauxite finds (1970-80) include Shandong (over 1 million tons), Henan (several hundred million tons in Luoyang and Sanminxia), Sichuan (large mineral bed in the western part of the Province), Guizhou (new finds in 20 counties), and Guangxi (2 billion tons in Pingguo).

Composition of Chinese bauxite from four areas was characterized as follows:

Area	Percent			
	Al_2O_3	SiO_2	Fe_2O_3	TiO_2
Shanxi, Xiaoyi	79.49	1.01	1.29	3.02
Henan, Xinan	70.38	8.51	1.56	3.27
Guizhou, Xiuwen	70.24	6.44	1.57	3.32
Guangxi, Pingguo:				
Nadou area	55.96	6.18	18.54	3.13
Mining area 1	77.09	2.12	1.22	5.38
Mining area 2	75.98	1.87	2.01	4.19

In addition, alunite, andalusite, and nepheline are also used in China.[19]

Copper.—China's current copper metal production is close to 300,000 tons per year. Domestic output was principally from mines in Anhui, Hubei, Liaoning, and Yunnan, and also from mines in Gansu and Henan. Domestic mine output has been supplemented by imports of concentrates from Canada, Chile, Papua New Guinea, Peru, the Philippines, and Zambia as well as from purchases of copper metal. Annual domestic consumption was about 450,000 tons. In April 1981, under China's economic readjustment policy, development of copper resources by Sumitomo Metal Mining Co. Ltd. and Fluor Corp. in Jiangxi was postponed. However, in early March 1982, China reportedly informed Sumitomo to resume construction of a 90,000-ton-per-year blister copper smelter, which would also produce 360,000 tons per year of sulfuric acid at Guiyang, Jiangxi. Status of the proposed Fluor project at Dexing, Jiangxi, is unknown.

The Overseas Mineral Resources Development Corp. of Japan was reportedly contacted to conduct feasibility studies on developing copper deposits at Anqing, Anhui. The deposit at Anqing was believed to contain 31 million tons of ore grading 1.34% copper.

Gold and Silver.—Because of the need for foreign currency and the high price of gold, China was believed to have increased gold production. However, Government holding of monetary gold reserves of 12.67 million troy ounces remained unchanged for 1981-82 as revealed by official Chinese sources. On September 15, 1982, the People's Bank of China issued four weights of gold commemorative coins (99.9% gold)—1.0, 0.5, 0.25, and 0.1 ounce—to be distributed by Po Sang Bank Ltd. in Hong Kong and Taisei Stamps and Coins Co. Ltd. in Japan. The coins, bearing the image of the giant panda and the Hall of Qinian in Tiantan, commemorate the normalization of Sino-Japanese diplomatic relations. In 1979, China issued commemorative gold coin sets for the 30th anniversary of the founding of China. Gold used in the minting was replaced by purchases in Hong Kong.

China has a centralized policy for state purchase and distribution of gold and silver. Sales of gold and silver ornamental articles were restricted to foreign purchasers. However, the People's Bank of China resumed state sales of gold ornaments in late September 1982, after 30 years of prohibition.

Based on an early news release by the Ministry of Metallurgical Industry, China's mine output of gold may have increased by 12%. China's largest producers are Heilongjiang and Shandong; the latter Province produces about 485,000 troy ounces per year or about 25% of national output. About two-thirds of Shandong's output is from 5 state-owned mines with a processing capacity of 500 tons per day; 7 county-run mines with a 100- to 150-ton-per-day capacity; and 18 county, commune, and brigade mines with a 25- to 50-ton-per-day capacity. Davy McKee Corp. of Great Britain had completed a feasibility study of two mines in Shandong that was to be the basis for significant expansion of mining and production rates using the most current technology in underground operations and gold recovery processing.

On September 22, the largest gold nugget reported in China was found in Huma County, Heilongjiang. The nugget weighed 107 troy ounces. Gold occurrences in Heilongjiang are well known, dating back to the Qing dynasty when output was purportedly about 400 ounces per day in the 1880's. The State Capital Construction Commission and the People's Liberation Army have been active in verifying gold-bearing sites in the Province. Presently, there are three gold-mining vessels in operation dredging for gold. Between August 1 and August 9, 1982, 555 ounces of gold was recovered by the three vessels. A fourth vessel was under construction for gold dredging.

The Hunchun Mine in Jilin produces about 15,000 ounces per year. Annual gold output in Liaoning is about 46,000 ounces compared with about 5,000 ounces for Guangdong. Annual output in Nei Monggol is about 102,000 ounces, mostly from around Qahar Yonyi Zhong. A gold mine at Ankang Xiang, Shanxi, was being developed to recover 19,000 ounces of gold per year. The Tongguan Mine in Shanxi annually produces about 6,500 ounces.

A rich alluvial gold occurrence was reported at the upper reaches of the Minjiang in Sichuan, and a copper deposit in Huli was reported to have high silver values. A large gold-silver find was reported in a metamorphic lode in Lishiu, Zhejiang. The gold mine at Suichang, Zhejiang, was modifying its operation to recover higher gold values.

In addition to native gold and silver, precious metals are recovered from copper anode slimes. For instance, the Tianjin copper refinery produced 18,000 ounces each of gold and silver in 1982. In addition, the Yongsheng waste material refinery recovered 3,600 ounces of gold and 772,000

ounces of silver.

Iron and Steel.—Eleven iron and steel complexes accounted for 86% of China's steel production: Anshan, Baotou, Beijing, Benqi, Maanshan, Panzhihua, Shanghai, Taiyuan, Tanggu, Tianjin, and Wuhan. Collectively, the installed national steel output capacity was 40 million tons. With the exception of Shanghai, all the major complexes are located near indigenous resources of coal and iron ore. The east coast of China contains by far the highest concentration of steelmaking plants.

Since the beginning of China's readjustment program in 1979, attention has been focused on the steel industry to improve steel quality, increase product variety, conserve energy, and increase profits. China's steel sector is outmoded, and equipment and technology date to the early 1950's. During that decade, Anshan and Taiyuan were updated and Baotou and Wuhan were built with technical assistance from the U.S.S.R. By 1958, reforms came to a halt, and by the 1980's, a technology gap of 15 to 20 years was formed.[20]

China's mine production of iron ore may run as high as 110 to 120 million tons per year and consists mostly of low-grade ore (about 30% iron). In 1982, mine construction was underway to produce a designed annual capacity of 22.5 million tons of iron ore, which was still considered insufficient to meet future requirements. Moreover, new annual ore dressing capacity being installed was only 6 million tons. The capacity of mines under development will essentially make up only for losses in capacity of existing mines. In ore dressing, fine screening and regrinding have been promoted to improve magnetic separation for higher quality concentrates.

During 1981, 346 small blast furnaces with high energy consumption were shut down and operation of 152 other small furnaces were discontinued temporarily, collectively representing a capacity of 18,000 cubic meters. Another 120 small ironworks were technically upgraded. These measures were adopted to weed out inefficiency by reducing coke and energy consumption.

Similarly, the nation's key ironworks and steelworks were to improve management and efficiency. The problems of the key ironmakers and steelmakers also included high energy consumption, averaging 1.186 tons of standard coal equivalent per ton of steel with some consuming as much as 1.5 tons. Water consumption was high, and consumption by the major enterprises totaled 3 billion tons each year. Freshwater consumption per ton of steel averaged 89 tons. Moreover, pollution was a serious problem, the incidence of accidents was high, and occupational health hazards were relatively high. Average labor productivity was low (14.7 tons per worker in 1981 for the industry compared with 19.0 tons per worker in 1966). Economic returns were low. The average rate of return on funds did not reach 10% in 1981; for some, the rate did not reach 6%.[21] To remedy the problems, the industry was to carry out major reforms and innovation as well as to focus on obtaining better quality and more variety of products and on practicing energy conservation.

In 1982, China's output of ferroalloys was 880,000 tons and for crude steel, 37 million tons. Specialty steel output was 2.5 million tons in 1982 compared with a high of 3.0 million tons in 1980. Output of high-speed tool steel was 16,000 tons in 1981 compared with 27,000 tons in 1978. Production of rolled steel, wire, sheet, and welded steel pipe in 1980 was 15.51 million tons compared with 9.74 million tons in 1978.

The major ferroalloy plants are near iron and steel complexes, raw material sources, and energy sources. Annual capacity of China's major ferroalloy producers was as follows, in tons:

Plant	Capacity
Jilin ferroalloy	200,000
Xinyu iron and steel (Jiangxi)	150,000
Shanghai ferroalloy	120,000
Hunan ferroalloy	100,000
Hengshan ferroalloy (Zhejiang)	40,000
Jinzhou ferroalloy (Liaoning)	40,000
Xibei ferroalloy (Gansu)	40,000
Zunyi ferroalloy (Guizhou)	30,000
Emei ferroalloy (Sichuan)	20,000

With the exception of chromium, China has ample raw material for ferroalloys. For example, silica is mined in various Provinces including Liaoning, Gansu, and Jiangsu; manganese in Fujian, Jiangsu, Liaoning, Hunan, Jiangxi, and Hebei; vanadium in Sichuan; and tungsten, in Guangdong and Guangxi. Some chromite is mined in Xinjiang but is chiefly for refractory applications. China is dependent on imports for more than one-half of its chromite supply. Foreign sources of chromite probably include the Philippines, Iran, Turkey, Pakistan, and Yugoslavia. In 1982, Sumitomo

signed a conversion contract to ship chromite from the Philippines to China for processing and then to Japan in the form of ferrochrome.

An information network under the aegis of the People's Bank of China was established linking the iron and steel companies in Anshan, Baotou, Beijing, Benxi, Chongging, Fushun, Maanshan, Panzhihua, Taiyuan, Tangshan, and Wuhan and the steel mills in Beijing, Shanghai, and Tianjin. Surveys will be conducted to provide a basis for forecasting marketing needs. Initial studies were to be made on demand forecasts for steel strip, sheet, wire, and plates. Also, present stocks of rolled sheet will be inventoried. At the end of 1981, it was estimated that there was an overstock of 20.6 million tons of rolled steel.

The first-stage construction of Baoshan iron and steel complex proceeded on schedule and was expected to be completed in 1985. The first 350,000-kilowatt, power-generating unit began operating on November 20, 1982, and a second unit was expected to be installed by mid-1983. Installation of the No. 1 blast furnace with an inner volume of 4,063 cubic meters was expected to be completed in early 1983; installation of one of the 300-ton oxygen top-blown converters and six 400-ton mobile cranes was completed, as well as the installation of two 1,300-millimeter blooming mills and the continuous rolling mills for bars. Work continued on the coking and sintering plants.

Construction of a 9-million-cubic-meter water reservoir was to start in 1983 to house water diverted from the Chang Jiang for Baoshan. Beilun, in northern Zhejiang, was being developed as a transshipping port for Baoshan. The deepwater harbor was designed to handle 20 million tons of ore annually and have one berth for 100,000-ton ships and two berths for 25,000-ton vessels. Also, the ship scrapping facility on Chongming was being expanded to increase scrap generation capacity. At the completion of stage one, Baoshan will have the capacity to produce 2.8 million tons of pig iron, 3 million tons of crude steel, and 0.5 million tons of steel products.

Nearby in Jiangsu, the Meishan iron smelting complex was nearing completion. The Meishan complex consists of an iron ore mine, an ore dressing plant with an annual capacity of 2.5 million tons, and two blast furnaces for producing 1.1 million tons of pig iron per year. Meishan was built to supply the needs of Shanghai's steel industry, 300 kilometers to the east.

Innovation and modernization at Shoudu iron and steel complex continued, and in 1982, its profits increased by 23%. Shoudu's current annual production capacity includes 12 million tons of iron ore, 1.3 million tons of coke (four coke ovens), 3 million tons of pig iron (four blast furnaces), 1.5 million tons of crude steel (three furnaces), and 1 million tons of steel products (one rolling mill). Renovation at Shoudu included the powerplant, the ore dressing plant, the No. 2 blast furnace, and the rolling mill. Some of the resulting savings included recovering 180,000 tons of iron ore powder, reduction of coke consumption to 390 kilograms per ton of iron, and reducing energy consumption for each ton of steel produced to 960 kilograms of standard coal.

In early 1982, the Government approved plans for the modernization and expansion of China's leading steel center, the Anshan iron and steel complex, by 1985. Anshan's annual output of steel was to be increased from 6 million to 7 million tons, and of rolled steel, from 4.21 million to 4.53 million tons. About $700 million will be spent to improve iron smelting, steelmaking, steel rolling, energy savings, and environmental protection. Particular emphasis will be given to upgrade the rolling mills to raise the quality and mechanical properties of rolled steel.

The recently installed 1.7-meter rolling production line at Wuhan iron and steel complex produced 1.2 million tons of steel sheets. The main installations for hot-rolling components were imported from Japan, and installations for cold-rolling and continuous casting were imported from the Federal Republic of Germany. Wuhan's product lines include cold- and hot-rolled steel sheet, zinc-coated sheet, tinplate, and cold-rolled silicon sheet.

A 200-ton electroslag furnace was constructed and installed at the Shanghai heavy machinery plant in 1981. The furnace turned out a 127-ton electroslag steel ingot in October 1981 and an 85-ton ingot in May 1982. The furnace will be used to produce large forgings for rotors in generators.

Benxi Iron and Steel Co. announced the discovery of magnetite deposits with an estimated reserve of 150 million tons located northeast of Anshan, Liaoning. Benxi currently operates the open pit Nanfen Mine as a captive source of iron ore. The Hainan Mine produced about 3.6 million

tons of iron ore in 1982. This ore, however, is not locally consumed and is shipped to the mainland for smelting.

Lead-Zinc.—Although China has a long history of lead-zinc mining, metal output by this sector is limited. Installed annual capacity to produce lead and zinc metal was about 175,000 tons and 250,000 tons, respectively. China imports small tonnages of lead ore from Australia and about 25,000 tons of unwrought lead from Australia, Canada, and Mexico. Known imports of zinc are insignificant. The invisible trade with North Korea could conceivably include Chinese receipts of both lead and zinc.

Development of a lead-zinc mine in Chengxian, Gansu, continued and was not expected to be completed until 1985 with an annual output of 110,000 tons of lead-zinc concentrates. Output will be partly for domestic smelters and also for export. The Qinghai Provincial Construction and Development Co. was undertaking the development of a lead-zinc deposit in the Xitie Mountains in the Qaidam Basin. Construction began in May 1982.

Molybdenum.—China planned to develop the Xinhun molybdenite deposit at Xiaojia Yingzi (Kazhuo County, Chaoyang Prefecture), Lianong. The deposit covers an area of 60 square kilometers with proved reserves estimated at 46 million tons averaging 0.228% molybdenum. The skarn deposit is concentrated within an area of 2.4 square kilometers between Xiaogzi and Kangzhangzi. The area is linked by a highway, 25 kilometers from the Gongyingzi railway station on the Jinghou-Chengde railway. Electric power can be supplied by the northeast China power grid—the mine area is 25 kilometers from the Huangtuliangzi transformer stations. Water is available from two rivers within 20 kilometers as well as from ample underground water. Development of the deposit was to cost $15 million and take 3 years. On completion, capacity was to be 330,000 tons of dressed ore per year.

Nickel and Cobalt.—China's nickel output is centered on the Jinchuan nickel sulfide deposits in the Gobi wilderness at the foot of the Longshu Mountains, 50 kilometers north of Yongchang in Gansu. Nickel reserves in Gansu constitute about 68% of the total national reserves. One underground and one surface mine were in operation at Jinchuan. Ore from the underground mine contains up to 5% nickel, and the voilarite from the underground mine has a nickel content of 0.5% to 1.5%. The deposit was discovered in 1958, the first mine (surface) was opened in 1964, and development of the underground mine was completed in 1969. In 1964, an electrolytic plant with an annual designed capacity of 10,000 tons of nickel went into operation. In 1978, a recovery circuit for platinum-group metals, designed by the Kunming Metal Research Institute and the Beijing Central Design and Research Institute, was in place. In 1979, a recovery circuit with a designed annual capacity of 450 tons of cobalt was put into operation. In 1980, the annual capacity for electrolytic nickel was raised to 15,700 tons. Annual output of nickel and cobalt in China, however, was probably close to 10,000 and 15 tons, respectively (cobalt production was reported by a Chinese official at 200 tons per year). Nickel output from Jinchuan was being expanded, and production was expected to be quadrupled in the late 1980's.

In addition, an open pit nickel sulfide mine in Baiyan, Gansu, is currently being exploited. Both a surface and an underground mine (nickel sulfide) were in operation in each of the following: Panshi, Jilin (with associated platinum-group metals), and Huili, Sichuan, since the early 1950's. Nickel sulfide deposits in Xiaonanshan, Nei Monggol, also contain appreciable values of copper, bismuth, titanium, and platinum-group metals.

Cobalt is recovered from converter slag in nickel production. China, however, has cobalt in asbolite and in cobalt-bearing pyrite.

In addition to Jinchuan, China's nickel producers include (1) Beijing rare metal extracting and smelting plant—cobalt, platinum-group metals, and nickel-chromium wire; (2) Baiyin Nonferrous Metal Co. (Gansu)—annual nickel metal capacity of 5,000 tons, however, capacity was less than 1,000 tons because of inadequate electricity supply; (3) Baoji nonferrous metal processing plant (Shaanxi)—treats ore from the Qinling Mountains for nickel and platinum-group metals; (4) Daye Nonferrous Metal Co. (Hubei)—producer of copper, nickel, and cobalt; (5) Gansu Metallurgical Co.—annual designed nickel metal capacity of 5,000 tons; (6) Handan iron and steel plant (Hebei)—recovers nickel as well as cobalt, copper, gallium, selenium, sulfur, tellurium, and vanadium; (7) Luoyang copper processing plant (Henan)—copper and nickel; (8) Jilin smelting plant—nickel, cobalt, and platinum-group metals; (9) Panshi nickel mine and phosphate fertilizer plant (Jilin)—

new enterprise to be opened in 1983 will recover nickel and cobalt; (10) Shanghai facilities—Baohua, Haiguang, and Shanghai metal smelting plants; Hongse, Rongguang, and Xinghuo smelting plants; and Shanghai and Xingfeng nonferrous metal smelting plants; (11) Shenyang smelting plant (Liaoning)—copper and lead as well as nickel, cobalt, and platinum-group metals; (12) Tianjin copper electrolysis plant—copper and nickel; (13) Tongling Nonferrous Metal Co. (Anhui)—copper, nickel, and cobalt; (14) Wuhan nickel electrolysis plant (Hubei)—nickel and cobalt; (15) Xiaosigou nonferrous metal smelting plant (Hebei)—copper, nickel, cobalt, and zinc; (16) Xingtai smelting plant (Hebei)—nickel from Handan Xingtai iron deposits in southern Hebei, which also contain cobalt, copper, gallium, selenium, tellurium, and vanadium; and (17) Zhenjiang smelting plant (Jiangsu)—nickel and cobalt. The following conduct research on recovery of nickel, cobalt, and/or platinum-group metals: Beijing Iron and Steel Technology Institute, Central Institute of Mining and Metallurgy, and Kunming Metallurgical Research Institute.

Rare-Earth Minerals.—The China Rare Earth Co. produces rare earths from the tailings of iron ore beneficiation at Baotou, Nei Monggol. In 1981, China Rare Earth produced 10,000 tons of rare-earth concentrates, 10,000 tons of ferrosilicon rare-earth alloys, 10,000 tons of rare-earth alloys, 2,000 to 3,000 tons of mischmetal, and 1,000 tons of rare-earth chloride.[22] China Rare Earth was seeking foreign assistance in 1982 for technology and funds for the production of anhydrous rare-earth chloride, a mischmetal plant, an individual rare-earth separation plant, and a rare-earth-cobalt permanent magnet plant. The first plant was to be designed for an annual capacity of 3,600 tons of anhydrous rare-earth chloride (1,500 tons available for export) and 1,000 tons of mischmetal (500 to 800 tons for export). The second plant would produce individual rare-earth oxides from 2,200 tons of rare-earth chlorides, of which 30% to 40% would be exported. The third plant would produce 5 tons of samarium-cobalt magnets, 1 ton of samarium-gadolinium-cobalt magnets, 6 tons of praseodynium-samarium-cobalt magnets, and 88 tons of cerium-cobalt-iron magnets, of which 80% to 90% were to be exported.

Airtrust Singapore Pte. Ltd. and its U.S. subsidiary, Airtrust International Corp. (Texas), formed a joint venture with China Rare Earth to market China's rare-earth products. Products available for export include bastnaesite concentrates; rare-earth chlorides, oxides, fluorides, and hydrates; rare-earth ferroalloys; individual rare-earth compounds and metals; mischmetal; and yttrium.

In addition to production in Nei Monggol, other rare-earth producers in China were Jiangxi Rare Earth Corp. in Nanchang, Gansu Rare Earth Corp. in Lanzhou, and the Yao Long chemical plant in Shanghai. All of which produce a wide range of rare-earth products. Gansu Corp. reportedly accounts for 50% of China's export of rare-earth chlorides.

Tin.—China's tin belt extends from Guangdong through Guangxi and Hunan to Yunnan. China's largest tin-producing base is the Yunxi Co. at Gejiu, Yunnan. A national conference on tin production and research was held at Gejiu in early May 1982 under the sponsorship of the State Scientific and Technological Commission and the Ministry of Metallurgical Industry. The conference focused on problems in China's tin industry: lack of well-defined data on reserves, low smelting yields, loss in production capacity, and excessive domestic consumption. Geologic exploration was to be intensified in Gujang and Dianxicheng, Yunnan, as well as in other Provinces; means to increase tin recovery were to be investigated, and research to use substitutes for tin was to be conducted.

A rich occurrence of tin was discovered in Yunnan, but the location was not disclosed. The deposit was reported to have the highest tin content of all known reserves in the Province, and the 30 veins surveyed could be exploited by open pit mining. Fairly rich deposits of tin were reportedly found in 10 counties of Huiyang Prefecture in Guangdong.

China's tin production has been variously estimated from about 15,000 to 30,000 tons per year, mostly from Yunnan and Guangxi. The Dachang Mine in Guangxi reportedly has an installed annual capacity of 10,000 tons of tin.

Titanium.—Ilmenite from dredging operations is produced in Guangdong, Guangxi, and Hainan Dao. Titanium slag is produced at Panzhihua, Sichuan, and at Chengde, Hebei. Small titanium sponge plants are located in Fushun, Liaoning, and in Shanghai. Ilmenite in Guangxi reportedly contains up to 51% titanium oxide, and the

region's import and export committee was inviting foreign participation for technology to construct a 2,000- to 5,000-ton-per-year titanium sponge facility. Also, a 1,000-ton-per-year titanium sponge plant was proposed for Hainan Dao. Guangzhou heavy machinery plant wanted foreign assistance to add 1,000 tons per year capacity for titanium machining and manufacturing technology, and the Shenyang Machinery and Power Equipment Bureau wanted foreign technology to add 1,000 tons per year capacity for the production of titanium pumps and valves.

An ilmenite deposit covering 6 square kilometers was found in Tengxian County, Guangxi. Estimated reserves were 1.3 million tons. Fujian Province proposed the construction of a 50,000-ton-per-day synthetic rutile plant in Fuzhou.

Tungsten.—According to Japan's Ministry of International Trade and Industry, China accounts for 53% of the world's tungsten reserves and 20% of the world's production. China has attended all the organizational producer sessions on tungsten of the United Nations Conference on Trade and Development (UNCTAD) but has not joined other producing nations to establish a tungsten commodity agreement. In early November, China held its second national tungsten science and technology conference in Changsa, Hunan. During the conference, which was attended by 200 technical personnel, there was a review of China's progress in tungsten production of the past year, a summation of collective experiences, proposed solutions to existing problems, and arrangements for new items of work by the tungsten sector. Chinese exports of tungsten were under the direct control of the Ministry of Metallurgical Industry, which also grants export licenses for local and provincial sales.

Other Metals.—China is well known for antimony, and the Xikuangshan antimony mine is famous. The Dachang tin mine in Guangxi produces up to 7,000 tons of antimony per year. Although quantities are small in comparison to production in the United States, China has become a major source of U.S. imports of beryllium. The Zhuzhou nonferrous smelter in Hunan has an annual output capacity of 300 tons of cadmium. The Shaoguan metallurgical plant in Guangdong proposed adding 4 tons per year capacity for germanium recovery. Dachang has an annual installed capacity to recover 3 to 5 tons of indium. China is also well known for mercury production and has rich resources in Guizhou. Production of platinum-group metals is increasing, with most of the recovery a byproduct of nickel refining. Substantial vanadium is recovered from slag generated from the processing of titaniferous magnetite, and significant quantities of vanadium have appeared in the world market. The Qaidam Basin in Qinghai was being developed primarily to harvest minerals in salt lakes. Magnesium salts will be harvested, and possibly, there will be downstream production of magnesium metal because of adequate energy available in the area. Qinghai also has high-quality silica. In 1981, the Province exported 3,000 tons of silicon metal, mostly to Japan, and Qinghai exports accounted for 40% of the national total. The manganese deposit found in Daxin County, Guangxi, has reserves exceeding 100 million tons. Bismuth, selenium, and tellurium are recovered as byproducts of base metal refining at plants such as Guangzhou smelter, Guangdong, and Shenyang smelter, Liaoning.

NONMETALS

Asbestos.—Production of asbestos was reported at 131,700 tons in 1980, and output in 1981-82 was probably in the 100,000- to 110,000-ton range. Because of the wide differences in the characteristics of asbestos mined in China, dressing varies widely. The Chaoyang Xinsheng underground asbestos mine, a small operation, has an annual dressing capacity of 8,000 tons. The plant was redesigned to simplify the separation of asbestos fiber from gangue and powdery dust. The Gansu Geological Survey conducted preliminary studies in an asbestos formation in Hongliugou.

Barite.—China's annual production of barite was estimated to approach 1 million tons. Guangxi is a large producer, and its annual exports reached 600,000 tons including shipments to Japan, Mexico, Romania, Southeast Asian countries, the United States, and the Federal Republic of Germany. The barite deposit in Xiangzhou County has a verified reserve of 5.1 million tons. A barite deposit in Yonfu County was being developed with U.S. assistance. China's resources of barite are mainly in Fujian, Guangxi, Hubei, and Shangdong. Current output satisfies both domestic and export needs.

A large barite occurrence was found in the western mountainous area in Fujian. A

provincial geological prospecting team estimated that the deposit contained 16 million tons of barite. Most of the ore was exposed or covered by a thin layer of red soil. The area has easy access to nearby highways and railways, which is convenient for mining and transportation. Development of the deposit located in Lifang, Dahu, Yongan County will yield an initial annual production of 150,000 tons.

Bentonite.—Heishan County, Liaoning, is one of China's major bentonite-producing areas. The Heishan open pit mine has an annual production capacity of 200,000 tons of ore and 100,000 tons of bentonite powder. Total resources were estimated at 500 million tons, including 39 million tons of proven reserves of calcium bentonite and 30 million tons of sodium bentonite. The mine was planning to import equipment and technology to produce 50,000 tons per year of activated sodium bentonite. A bentonite deposit was found in Guangxi with estimated reserves exceeding 100 million tons. The 11-layer deposit covers 20 square kilometers.

Cement.—China's cement industry is large but is dominated by small producing units. There were 2,469 small cement enterprises, which accounted for 59% of the output, or an average for each of 20,100 tons per year. Forty-nine cement producers with annual capacities over 500,000 tons accounted for the rest of the national output. Because of increasing demand, China was constructing nine new cement plants and expanding eight existing plants to add about 15 million tons of new annual capacity.

In Anhui, preparations were made for the construction of the 1.5-million-ton-per-year plant. A 1- to 1.5-million-ton-per-year plant was planned for Tongling. The 500,000-ton-per-year Baimashan plant outside of Wuhu was put into full operation in March 1982 and was to be expanded by another 500,000 tons. In Fujian, two new cement plants were proposed—a 1.25-million-ton-per-year plant at Dahu, Yonjan County, and a 700,000-ton-per-year plant at Shuinan, Chengguan. The Liuzhou cement plant in Guangxi was being expanded to 1 million tons per year.

Construction continued on the 1-million-ton-per-year Huaihai plant (Maocun, Tongren), Jiangsu. This project includes the development of a limestone deposit with an annual output of 1.2 million tons. Completion was expected at the end of 1983. The Yaoxian cement plant in Shanxi was to purchase kiln capacity of 600,000 tons. This plant has an existing annual capacity of 920,000 tons. Shandong Province proposed the 1.2-million-ton-per-year Lunan plant for Mashan, Tengxian County, Zaozhuang City.

The 460,000-ton-per-year Qujiang plant was under construction in Sichuan as was the 450,000-ton-per-year Changxing plant in Zhejiang. Other major cement plant construction, either planned or underway, included projects in Hebei, Heilongjiang, Henan, Jilin, Shanxi, Xinjiang, and Yunnan.

Over 88% of the energy supply for China's cement industry is provided by coal, the remainder is from oil and natural gas. Efforts were being made to develop and promote the use of large rotary kilns with cyclone preheaters (precalcining burners) to conserve energy. China has identified 500 limestone deposits with estimated reserves of 20 billion tons.

Feldspar.—A feldspar deposit was discovered in Shibeichong, Hengshan Mountain area in Hunan. Ore reserves were estimated at 10 million tons containing high-quality sodium feldspar. The ore bed, at its thickest point, is more than 60 meters wide.

Fertilizer Materials.—China has more than 2,200 fertilizer plants, of which 1,300 are small with an annual capacity each between 5,000 and 20,000 tons of ammonia. Most use anthracite as an energy supply, except for a few that use natural gas or heavy oil. Presently, China is capable of designing and manufacturing small ammonia units with annual capacities ranging from 10,000 to 150,000 tons. During the 1970's, China imported 13 ammonia plants, each with a daily output capacity of 1,000 tons. However, output by small plants collectively accounts for approximately 55% of the national total.

On the other hand, the output of nitrogenous ingredients is disproportionate to the output of phosphate and potassic fertilizers, which is less than 3 million and 30,000 tons, respectively. China's phosphate reserves were estimated at 11.9 billion tons, of which 80% was phosphorite. To balance the national fertilizer ingredient ratio, three large phosphate mines were being developed—Wangi in Hubei, Kaiyang in Guizhou, and Kunyang in Yunnan; two pyrite mines—Yunfu in Guangdong and Tanyaokou in Nei Monggol; and one potash plant—Qarhan in Qinghai. Upon completion of the first stage in 1985, the Qarhan plant will have an annual output of 200,000 tons of potash. The plant will later be expanded to produce 1

million tons per year. The 5,000-square-kilometer Qarhan Salt Lake contains 153 million tons of potassium chloride, 97% of China's potassium reserves.

Fluorspar.—Two fluorspar finds were reported in Guangxi; Yulin County with reserves of 2.28 million tons and Ziyuan County with 1.49 million tons. The Guangde Mine in Anhui has reserves of 1.93 million tons containing 53.99% calcium fluoride. The mine and dressing facility at Guangde was to be expanded to process daily 100 tons of ore to produce 12,000 tons of powdered concentrates per year. Fluorspar production and exports in Guangdong have declined about 46% from 1974 to 1980. Plans to increase output were being studied by provincial authorities. The largest mine in Guangdong is in Heyuan County.

Total annual production of fluorspar in China was estimated at 400,000 to 500,000 tons.

Gem Stones.—According to the Xingiang Geological Department, numerous varieties of jade and gem stones have been discovered in the autonomous region. The finds included garnet, sapphire, emerald, aquamarine, spodumine, tourmaline, ruby, amethyst, amaronite, and jade over a wide range of varieties.

In Shandong, a 96.94-carat diamond was found in the Chenjiafu diamond placer mine near Tanchenq. This is the third largest diamond found in the area; the first, found in 1979, weighed 158.786 carats, and the second, in 1981, weighed 124.27 carats. Other diamonds as well as numerous garnets weighing over 10 carats have been found. The diamonds were believed to have originated from a formation in the Yimeng Mountain range. However, there was also speculation of a primary diamond formation undiscovered in the area.

Graphite.—Heilongjiang has the largest reserves of graphite in China, based on geologic surveying of 14 deposits. The largest occurrence, found near Jixi, was estimated to have reserves of 300 million tons and was suitable for open pit development. Another large deposit occurs in the Heling area of Boli County. Provincial authorities were planning to expand the Liumao Mine, also in Jixi, which has been operating for 40 years. Graphite is also produced in Hunan at Lutang. Current output by the Nanshu Mine in Laixi, Shandong, was close to 16,000 tons. A small mine near Hai Kou, Hainan Dao, was to be expanded to a 2,000-ton-per-year capacity. The Hohhot graphite mine in Nei Monggol was seeking foreign assistance to expand mine output by 5,000 tons per year.

Gypsum.—A gypsum deposit was discovered near Hohhot (Otog, Ih Ju), Nei Monggol, with estimated reserves of 17 million tons. A larger gypsum find was reported near Chongqing, Sichuan, with reserves over 100 million tons. The ore body measured 1,600 by 38 by 80 meters. A deposit containing reportedly more than 2 billion tons of gypsum was found in Tongxin County, Ningxia. The deposit has thick seams near the surface and was suitable for surface mining. The Sihui Mine near Bei Jiang, Guangdong, has estimated gypsum reserves of 90 million tons; annual production, however, is only about 28,000 tons.

Talc.—China's annual talc production was about 900,000 tons. Liaoning, the largest producer, has an annual output capacity of 500,000 tons from seven state-run mines. In the past 30 years, Liaoning's annual export of talc averaged 200,000 tons. The Heicheng Mine in the suburbs of Anshan produces 125,000 tons of talc per year.

Talc deposits are widely distributed in 10 counties in Guangxi including Beilu, Longsheng, Luchuan, and Shangling. Reserves in the Guping and Jizhua Mines alone are estimated to be 26 million tons. The Jizhua Mine produces 130,000 tons of talc per year. In early 1982, China announced the discovery of a talc deposit in Guangxi with reserves equivalent of 25% of the nation's total.

Other Nonmetals.—China is a significant producer of magnesite. Reserves in Liaoning alone are 3 billion tons with provincial output accounting for practically all of China's annual output of 2 million tons. Pyrite production was 4.1 million tons in 1982 compared with 5.9 million tons in 1981. China is a large producer of kaolin and salt. The output of salt, reported at about 16 to 18 million tons per year, is grossly understated considering the enormity of consumption by China's population and its growing industrial needs. In addition to kaolin, attapulgite clay was discovered in Jiangsu. The Ministry of Geology and Minerals disclosed that China's resources of lithium accounted for nearly one-half of the world's total. China's lithium was concentrated primarily in the numerous salt lakes in Xizang.

Wollastonite was considered a rarity in China. According to a preliminary study, however, a wollastonite occurrence in Lishu County, Jilin, may contain reserves of 50

million tons. Foreign purchasers from Australia and Japan have expressed interest and requested samples of the Lishu find. Wollastonite also occurs in the Taye-Yangxin region of Hubei. Construction of the Xiamen soda ash plant in Fujian was inexplicably suspended in 1960 after the leveling of 21 hectares of ground and the installation of 17,000 square meters of building space. Construction of a plant was to resume at the site to produce 80,000 tons of soda ash and 180,000 tons of ammonium chloride annually.

MINERAL FUELS

Coal has historically constituted the major portion of China's energy resources and currently accounts for 70% of the country's primary energy output. The energy sector remains a weak link in the national economy. There are disparities between supply and demand throughout the country. Limited financial resources curtail massive energy development programs. Moreover, the nation's industry is hampered by outdated equipment and outmoded technology. As a result, there is a low rate of utilization and large waste of energy.[23]

Large-scale development along with energy conservation were to be key goals to meet China's long-term energy needs. Under China's economic plans through the end of the century, the energy sector would continue to have priority for investment and development. A forecast of China's energy supply was as follows, in million tons of standard coal equivalent and percent of total:[24]

	Coal	Oil	Natural gas	Hydropower	Total
1979:					
Quantity	454	151	19	20	644
Percent	70	23	3	4	100
1985:					
Quantity	514	157	21	28	720
Percent	71	22	3	4	100
1990:					
Quantity	643	214	27	35	919
Percent	70	23	3	4	100
2000:					
Quantity	1,000	329	46	54	1,429
Percent	70	23	3	4	100

Construction of China's first nuclear powerplant, with an installed capacity of 300,000 kilowatts, was underway at Qinshan, Zhejiang. A second plant was proposed for Guangdong.

The Government estimates that China's hydropower resources rank first in the world with a reserve of 680 million kilowatts. So far, only 3% of this reserve has been tapped. It was believed that 370 million kilowatts could be exploited and harnessed to generate 1.9 trillion kilowatt-hours of electricity per year. Presently, 20 hydropower stations are under construction throughout the country. The 2.71-million-kilowatt Gezhouba station on the middle reaches of the Changjiang is the largest, followed by the 1.3-million-kilowatt Longyang Gorge station on the upper reaches of the Huanghe. The remaining hydropower stations will be able to generate between 100,000 and 900,000 kilowatts. Stations, each with a generating capacity over 100,000 kilowatts, being constructed are Hongshi, Baishan, Louashan, Shuifeng, Taipingwan, Yuzixi, Ankang, Nanyahe, Tongjiezi, Wujiang, Dongjiang, Shaxikou, Wanan, Dahua, Tianshengqiao, and Lubuge.

Coal.—Coal accounts for 70% of China's primary energy source. China has large coal resources, and reserves were estimated at over 640 billion tons. Location of major coal deposits are as follows, in million tons: northeast China, 550; north, 10,662; east, 1,296; central-south, 350; northwest, 1,352; and southwest, 790.

The Government planned an average annual rate of growth of 2.5% in production to 1985. The principal measures taken to achieve this goal were to open new mines, modernize old mines, and mechanize coal tunneling, excavation, and transportation as well as pit prop replacement. For the long term in north China, Shanxi was to increase mine output capacity by 93 million tons, and Hebei, by 15 million tons. In northeast China, mine output capacity was to increase by 50.8 million tons with most of the increase from eastern Nei Monggol, 25 million tons, and Liaoning, 11.4 million

tons. The increase by the east China region was to be 52 million tons, mostly from Shandong, 21.5 million tons, and Anhui, 21.4 million tons. The increase for central-south China was 13 million tons; northwest China, 8.2 million tons; and southwest China, 7.7 million tons.[25]

Shanxi Province is China's leading producer with annual output over 130 million tons, about one-fifth of the national total. About 60% of Shanxi's production is shipped outside of the Province. Verified coal deposits in Nei Monggol exceed 190 billion tons. The open pit mines at Huolinhe and Yiminhe were under construction in 1982. Construction of the open pit mines at Yuanbaoshan and Zhungur were being planned. Also, the coal deposits at Dayan and Zhalainuoer were being studied. Because of its relative proximity to important industrial areas, Nei Monggol was expected to become China's second largest coal base after Shanxi.

China has looked to foreign capital to accelerate the development of its coal resources. Participation by Japan has been the most prominent. Cooperation by Japan has been extended through long-term trade agreement commitments, Export-Import Bank loans, and yen credits. In 1981, three Japanese technical missions visited China to conduct surveys. Currently producing mines visited were Lingxi and Lujiatao in Kailuan for coking coal and Datong for steam coal. New mines visited were Qianjiaying in Kailuan and Xiqu, Zhenchengdi, and Malan in Gujiao for coking coal, and Baodian in Yanzhou, Jiangzhuang in Tenguan, and Sitaigon in Datong for steam coal. The third group of mines visited were those that might possibly export coal to Japan in 1985—Xinglungzhuang in Yanzhou and Fangezhuang in Kailuan for coking coal; local mines in Datong and Yanbei, and Xinglungzhuang in Yanzhou for steam coal.

On September 5, 1979, a cooperative agreement was signed with the Government of Romania relative to the Bailong coking coal mine and washing plant, at Huo, Shanxi. The Romanians were to use export credit to provide equipment and technology. After completion, coal would be exported as compensation. On November 2, 1981, Tenshin Bocki Koshi of Japan agreed to loan the China Coal Development Co. 1 billion yen. Payment of principal and interest was to be made with coal exports over 5 years. On March 25, 1982, an agreement was reached with Occidental Petroleum Co. of the United States to make a feasibility study for an open pit coal mine at Pingshuo, Shanxi, with an annual capacity of 15 million tons. On May 15, an accord was reached with the Paris Development and Export Co. of France to develop the Dangtan coal mine in Yanzhou, Shangdong. Coal will be shipped to France as compensation. Fluor Corp. of the United States was awarded a contract to provide engineering and design service to increase capacity at the Fushun open pit coal mine in Liaoning. The output of the mine will be expanded to 5 million tons per year of coal and 8 million tons per year of oil shale.

Close to 82% of the coal consumed throughout China is unwashed coal. If washed coal were increased to 30% to 40% during the decade, China could save substantially on transportation capacity.[26] Presently, there are 99 coal washing plants with a collective annual designed capacity of 114 million tons. Tighter controls also were instituted to reduce ash and water content. The ash content of commercial coal dropped from 23.91% in 1978 to 21.18% in 1979. About 54% of the national coal output is from state-controlled mines, and the remainder is from local coal mines.

China's reserves of peat were estimated at 27 million tons. Reserves in Heilongjiang alone were 15 billion tons. Peat is also abundant in other areas of the northeast and in Sichuan. The Capital Construction Bureau of the Ministry of Petroleum Industry proposed peat development as an energy source as well as for raw material in fiberboard and light brick.

Petroleum and Natural Gas.—China's major oil-producing basins were Daqing, Jizhong, Liaohe, Dagang, and Karamay. The major gasfields were in Sichuan. Crude oil production stabilized at about 102 million tons in 1981-82.

Onshore, China's efforts to discover new finds will be concentrated on oil prospecting in the Songliao Basin, the Bohai Bay area, the Puyang region of Henan, and the Eren Basin of Nei Monggol. General surveying will also be conducted in the Junggar Basin in Xinjiang and the Qaidam Basin of Qinghai. Surveying and prospecting for natural gas will be concentrated in Sichuan. Offshore, China was cooperating with foreign companies for oil exploration and development.

On February 16 and March 16, 1982, China National Offshore Oil sent letters

of notification for the first round of bidding for joint exploration and development of China's offshore oil resources in the Yellow Sea and the South China Sea. By August 17, the closing day of bidding, 33 foreign oil firms submitted bids, 16 from the United States; 5 from the United Kingdom; 3 from Australia; 2 each from Canada, France, and Japan; and 1 each from Brazil, Italy, and Spain. Evaluation of the bids and contract negotiations was expected to consume most of 1983; drilling was not likely to begin until 1984 (blocks 4 and 5 in the Yellow Sea and blocks 6, 7, 8, 9, and 11 in the South China Sea).

In separate negotiations, Japan National Oil Corp. explored the western corner of Bohai Gulf (block 2) and the southern part of Bohai (block 3), Total S.A. Exploration of France had two exploration-development agreements—central Bohai Gulf (block 1) and northeast Beibu Gulf (block 12). Atlantic Richfield Co. had development rights in the Yinggchai Basin south of Hainan Dao (blocks 9 and 10).[27]

Uranium.—China is rich in uranium resources, and the vein-type deposits in volcanic rocks constitute the most important economic uranium source in China. Mesozoic volcanics are scattered extensively in eastern China, stretching 4,000 kilometers from the Hinggan Mountains in the northeast to Guangdong Province with a width between 200 and 800 kilometers. Other promising areas for uranium occurrences were in the Junggar and Tarim Basins in Xinjiang, Qaidan Basin in Qinghai, Alxa in Nei Monggol, and the Songliao plain and Heilongjiang-Nenjiang-Wusuli River basin in northeast China.[28] China has 10 atomic research reactors and has accumulated sufficient fuel to operate a 1.5-million-kilowatt nuclear powerplant for 30 years.

According to the Ministry of Nuclear Industry, China's first nuclear powerplant will be constructed on the northern shore of Hangzhou Bay, Zhejiang. The pressurized water reactor will have a generating capacity of 300,000 kilowatts. China's second nuclear facility will be at Daya, Dapeng Peninsula in Guangzhou, Guangdong. The Guangzhou installation will be equipped with two 900,000-kilowatt pressurized reactors.[29]

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[1]Physical scientist, Division of Foreign Data.

[2]The average annual exchange rates were as follows: 1977, 1.86 yuan=US$1.00; 1978, 1.68; 1979, 1.56; 1980, 1.50; 1981, 1.71. In 1982, the quarterly exchange rate ranged from 1.81 to 1.97, and the average annual rate was 1.89.

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The Mineral Industry of Colombia

By H. Robert Ensminger[1]

Colombia's real gross domestic product growth rate for 1982 dropped 1.3% to $40.9 billion[2] in constant 1970 dollars. This was Colombia's third consecutive year of slowdown. The 25% inflation rate was slightly lower than the 27% rate for 1981.

For the second consecutive year, the mining sector continued to be a bright spot in the Colombian economy. Both oil and gas output saw a significant increase, the result of Government efforts to step up production and regain self-sufficiency. The Eastern Plains Basin was expected to emerge as the most important oil producing region in the next 5 years.

The $400 million Cerro Matoso ferronickel project, near Montelibano, Córdoba Department, was dedicated in June. The facility is jointly owned by Empresa Colombiana de Niquel Ltda., 45%; Hanna Mining Co. of the United States, 20%; and the Royal Dutch/Shell Group of the Netherlands (Billiton Metals and Ores International Ltd.), 35%. The Bechtel Corp.'s Mining and Metals Div. of the United States provided engineering, procurement, and construction management services.

A group of 22 Japanese banks, led by the Export-Import Bank of Japan, signed an agreement to supply credits of $14.44 billion to the coal industry. The credits were to be used to finance the El Cerrejón coal project in northern Colombia.

The recent completion of a nationwide high-tension transmission network has given Colombia a more reliable power system. The grid links the major cities with the Atlantic and Pacific coasts and the southern Ecuadorean and northeastern Venezuelan borders.

An 18-month contract was awarded to a state institute to investigate legal, economic, and technical issues as a basis for a new tax structure to support mining, projection of future domestic and export demand for Colombian minerals, financing of future exploration, development of a mining workforce, the location and extent of specific mineral deposits, and policies to protect small- and medium-sized mines.

PRODUCTION

Oil and natural gas both showed increases in production. Oil output was up about 4% over that of 1981, while natural gas production showed an increase of about 3% over the 1981 figure. The Government has mounted a concerted effort to step up oil and natural gas production to a level of self-sufficiency by 1985. Petroleum refined products rose by approximately 2%. Coal output for 1982 was about 29% above the 1981 figure. This amount was boosted by the mining operation in the central zone of El Cerrejón, which went onstream in midyear.

Gold, the second most important mining activity in Colombia, declined by 11% owing to a drop in world prices during the first half of the year. Nickel became a new contributor to the Colombian economy in mid-1982. The output of 1,000 tons was purposely held at a low level owing to poor market conditions. The cement industry showed less than a 1% increase. Steel production was off slightly, with the best performance coming from the five semi-integrated steel plants serving regional markets.

Table 1.—Colombia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Chromite, gross weight	(2)	(2)	--	--	--
Copper, mine output, metal content	100	84	111	113	[3]113
Gold ---- troy ounces	246,446	269,369	510,439	529,214	[3]472,674
Iron and steel:					
Iron ore and concentrate ---- thousand tons	497	397	506	419	[3]470
Pig iron ---- do	298	241	279	233	[3]213
Ferroalloys: Ferrosilicon[e]	1,200	1,200	1,200	1,200	1,200
Crude steel ---- thousand tons	391	362	405	395	[3]390
Semimanufactures, hot-rolled ---- do	332	307	320	340	340
Lead:					
Mine output, metal content	120	226	187	154	[3]391
Refined (secondary)	2,000	2,500	3,000	3,000	3,000
Manganese ore, gross weight	20,011	21,453	21,400	20,300	20,300
Platinum-group metals ---- troy ounces	14,943	12,933	14,345	14,804	[3]11,806
Silver ---- do	76,773	99,331	151,542	[4]142,740	[3]136,043
Zinc, mine output, metal content	--	--	--	[4]152	150
NONMETALS					
Asbestos	NA	NA	NA	1,000	1,000
Barite	3,500	3,500	3,200	3,380	[3]3,000
Cement, hydraulic ---- thousand tons	4,153	4,257	4,351	4,459	[3]4,480
Clays:					
Bentonite	(2)	(2)	--	--	--
Kaolin	783,000	819,150	786,384	810,000	[3]855,684
Diatomite	630	[e]630	630	630	630
Feldspar	26,455	29,200	27,150	27,500	[3]30,091
Gypsum ---- thousand tons	255	257	262	298	[3]301
Lime, hydrated and quicklime[e] ---- do	1,300	1,300	1,300	1,300	1,300
Magnesite	1,400	1,582	[e]1,600	1,600	1,600
Mica	--	--	--	--	--
Nitrogen: N content of ammonia	63,600	[r]66,000	70,000	91,500	[3]97,800
Phosphate rock	1,320	6,776	6,370	[4]6,705	[3]25,393
Precious and semiprecious stones: Emerald:[4] carats	894,888	1,228,488	275,111	299,006	[3]395,960
Salt:					
Rock ---- thousand tons	377	383	347	316	[3]301
Other ---- do	460	369	491	399	[3]202
Total[5] ---- do	837	752	838	715	[3]503
Sodium compounds: Sodium carbonate	167,172	133,217	124,629	125,000	125,000
Stone and sand:					
Calcite	8,500	8,500	8,620	8,740	[3]8,700
Dolomite ---- thousand tons	32	29	14	15	[3]20
Limestone ---- do	9,431	9,700	9,760	10,053	[3]10,620
Marble	12,039	16,891	17,000	16,660	[3]16,843
Sand excluding metal-bearing	440,000	480,000	492,000	502,300	[3]527,415
Sulfur:					
Native (from ore)	35,000	16,050	25,647	26,300	26,000
Byproduct, from petroleum	3,239	2,262	1,959	2,200	3,000
Total	38,239	18,312	27,606	28,500	29,000
Talc, soapstone, pyrophyllite	4,320	6,085	5,900	6,050	[3]6,240
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	NA	NA	NA	NA	NA
Coal, all grades ---- thousand tons	4,754	4,885	4,947	5,030	[3]6,500
Coke, all types ---- do	530	507	500	500	550
Gas, natural:					
Gross ---- million cubic feet	147,014	150,695	160,666	174,800	[3]179,930
Marketed ---- do	97,319	108,181	118,534	120,000	130,000
Natural gas liquids:					
Propane ---- thousand 42-gallon barrels	2,614	2,491	2,712	2,800	2,800
Butane ---- do	589	552	577	600	600
Natural gasoline ---- do	723	816	790	800	800
Condensate ---- do	(2)	--	--	--	--
Total ---- do	3,926	3,859	4,079	4,200	4,200
Petroleum and refinery products:					
Crude ---- do	47,742	45,298	45,944	48,939	[3]51,100
Refinery products:					
Gasoline:					
Aviation ---- do	374	443	428	370	[3]446
Motor ---- do	18,348	18,042	20,400	23,500	[3]22,827
Jet fuel ---- do	3,150	3,517	3,521	3,500	[3]4,385

See footnotes at end of table.

Table 1.—Colombia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Kerosine thousand 42-gallon barrels	3,069	3,209	2,730	3,000	[3]2,446
Distillate fuel oil do	7,961	7,768	8,584	9,500	[3]9,857
Residual fuel oil do	18,947	15,254	17,023	15,400	[3]18,295
Lubricants do	333	511	403	550	[3]550
Other:					
Liquefied petroleum gas do	1,819	1,729	1,975	2,050	[3]2,172
Asphalt and bitumen do	598	706	942	1,130	[3]1,236
Refinery fuel and losses and unspecified products do	2,853	8,067	7,239	7,000	[3]5,045
Total do	57,452	59,246	63,245	66,000	67,259

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 12, 1983.
[2]Revised to zero.
[3]Reported figure.
[4]Data represent amount registered as Colombian exports.
[5]Treated salt volumes, as reported by the Ministerio de Minas y Energia.

TRADE

Carbones de Colombia (CARBOCOL), the state coal mining company, has signed contracts with Denmark and Ireland involving the sale of 2.2 million tons per year of coal beginning in 1986. CARBOCOL also announced two contracts with Spain. One called for the delivery of 350,000 tons of coal by yearend. The remaining contract with Spain calls for the sale of almost 600,000 tons of coal annually for 10 years beginning in 1986.

Exports of fuel oil and petrochemicals by Empresa Colombiana de Petróleos (ECOPETROL) showed a substantial rise. Indications are that this category represents a growing share of Colombia's mix in both the short and long term.

Cement exports fell 2% from that of 1981 to approximately $52.8 million, most of it going to the Caribbean region.

The value of emerald exports decreased about 19% from that of 1981 to $33.6 million in 1982.

Colombia exported 1,000 tons of nickel from the Cerro Matoso Mine. Two hundred tons was shipped to the United States, and the remaining 800 tons went to the Netherlands.

Table 2.—Colombia: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	11	23	--	Venezuela 20; Ecuador 3.
Metal including alloys, unwrought	142	NA		
Chromium: Oxides and hydroxides value, thousands	$1	NA		
Copper:				
Ore and concentrate	4,354	3,317	--	All to Japan.
Metal including alloys, all forms	59	12	2	Venezuela 4; Costa Rica 1; Ecuador 1.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	500	NA		
Steel, primary forms	6	NA		
Semimanufactures:				
Bars, rods, angles, shapes, sections	6	341	--	Ecuador 242; Venezuela 94; Peru 5.

See footnotes at end of table.

Table 2.—Colombia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Universals, plates, sheets	7	8	--	All to Venezuela.
Wire	92	53	--	Dominican Republic 25; Venezuela 25; Panama 3.
Tubes, pipes, fittings	453	512	13	Venezuela 303; Nicaragua 100; Ecuador 57.
Castings and forgings, rough	269	314	20	Peru 227; Venezuela 61; Costa Rica 3.
Lead:				
Ore and concentrate	361	92	92	
Metal including alloys, all forms	80	12	--	All to Venezuela.
Nickel: Metal including alloys, all forms	10	NA		
Silver:				
Ore and concentrate value, thousands	$135	NA		
Metal including alloys, unwrought and partly wrought do.	$1,423	$546	$546	
Zinc: Oxides	100	110	--	All to Ecuador.
Other:				
Ores and concentrates	60	NA		
Base metals including alloys, all forms	1	NA		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	4	34	--	All to Venezuela.
Grinding and polishing wheels and stones value, thousands	$1	$5	--	Peru $3; Ecuador $2.
Cement	830,677	698,538	24,374	Trinidad and Tobago 229,862; Venezuela 218,438; Mexico 136,545.
Chalk	180	2,417	--	Venezuela 1,637; Ecuador 260; Dominican Republic 240.
Clays and clay products:				
Crude	182	1,392	--	Venezuela, 1,057; Ecuador 329.
Products:				
Nonrefractory	22,393	27,726	26	Venezuela 27,211; Peru 375; Honduras 39.
Refractory including nonclay brick	3,899	3,584	--	Ecuador 3,299; Venezuela 260; Peru 15.
Fertilizer materials: Manufactured, ammonia	10,291	18,632	5,011	Turkey 6,300; Denmark 4,003; France 2,897.
Gypsum and plaster	11,226	660	--	Venezuela 600; Ecuador 60.
Lime	2,168	1,750	--	All to Venezuela.
Phosphates, crude	250	300	--	Do.
Precious and semiprecious stones other than diamond, natural value, thousands	$61,036	$64,094	$22,818	Japan $36,726; Switzerland $1,585; Australia $139.
Salt and brine	151,469	5,250	--	All to Panama.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	3,500	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	198	50	--	All to Venezuela.
Worked	124	87	--	Do.
Gravel and crushed rock	175	111	--	All to Trinidad and Tobago.
Sand other than metal-bearing	127	26	--	Ecuador 16; Peru 10.
Sulfur: Elemental, crude including native and byproduct	2,400	1,704	--	Ecuador 1,564; Venezuela 140.
Talc, steatite, soapstone, pyrophyllite	57	90	--	Venezuela 70; Panama 20.
Other:				
Crude	630	1,140	--	Ecuador 1,010; Venezuela 130.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	7,942	1,260	--	Panama 517; Netherlands Antilles 368; Nicaragua 119.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	666	3,931	--	Ecuador 2,954; Peru 703; Chile 274.
Coal: Anthracite and bituminous	95,429	89,323	--	Mexico 54,351; Venezuela 33,321; Argentina 1,500.

See footnotes at end of table.

Table 2.—Colombia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	63,111	33,704	--	Venezuela 16,971; Brazil 9,153; Mexico 5,000.
Petroleum refinery products:				
Gasoline: Motor thousand 42-gallon barrels	--	20	20	
Mineral jelly and wax do	6	33	30	France 1; Netherlands.[1]
Distillate fuel oil do	([1])	NA		
Lubricants do	1	([1])	--	Ecuador;[1] Peru.[1]
Residual fuel oil do	5,053	1,053	--	Italy 686; Netherlands 367.
Unspecified do	17	NA		
Tars and other crude chemicals derived from coal, gas, and petroleum	2,274	938	878	United Kingdom 60.

NA Not available.
[1]Less than 1/2 unit.

Table 3.—Colombia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals value, thousands	$1	$1	NA	NA.
Aluminum:				
Ore and concentrate	3,841	5,922	5,922	
Oxides and hydroxides	778	867	590	United Kingdom 111; West Germany 109; Brazil 24.
Metal including alloys:				
Unwrought	13,444	15,734	1,476	Venezuela 9,941; Canada 3,257; Yugoslavia 700.
Semimanufactures	4,916	--		
Chromium: Oxides and hydroxides	78	97	69	West Germany 14; Italy 7; Spain 7.
Cobalt: Oxides and hydroxides	8	6	4	Belgium-Luxembourg 1; United Kingdom 1.
Copper:				
Matte and speiss including cement copper	--	2	--	All from Brazil.
Metal including alloys:				
Scrap	18	NA		
Unwrought	2,768	2,316	--	Mexico 1,090; Chile 1,039; Peru 179.
Semimanufactures	11,975	10,458	NA	NA.
Iron and steel:				
Iron ore and concentrate	3,327	1,602	--	Venezuela 1,532; France 70.
Metal:				
Scrap	13,126	29,968	10,936	Netherlands Antilles 13,810; Ecuador 4,330; Panama 400.
Pig iron, cast iron, related materials	338	7,046	450	Brazil 3,825; Mexico 1,365; Cayman Islands 660.
Ferroalloys	10,517	5,424	218	Brazil 3,206; Mexico 1,365; Chile 374.
Steel, primary forms	41,937	57,433	1,301	Spain 14,279; East Germany 8,792.
Semimanufactures:				
Bars, rods, angles, shapes, sections	85,081	61,803	6,064	Japan 10,357; United Kingdom 8,860; Poland 8,559.
Universals, plates, sheets	258,400	270,678	7,681	Japan 162,779; Venezuela 28,640; West Germany 20,268.
Hoop and strip	5,140	4,179	437	United Kingdom 1,542; Japan 1,264.
Rails and accessories	1,174	1,434	395	Poland 500; Italy 256; Belgium-Luxembourg 165.
Wire	5,982	7,091	576	Venezuela 3,004; Brazil 2,206; Japan 861.
Tubes, pipes, fittings	61,513	94,702	11,263	Japan 43,201; Italy 21,143; Brazil 7,749.
Castings and forgings, rough	3,357	1,798	579	Spain 943; Belgium-Luxembourg 150; Denmark 40.
Lead:				
Oxides	815	796	--	Mexico 455; Peru 334.
Metal including alloys:				
Scrap	2,435	1,690	--	Peru 1,522; Denmark 132; Panama 25.

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys —Continued				
Unwrought	182	290	--	Peru 270; Mexico 20.
Semimanufactures	25	600	3	Peru 577; West Germany 14; Netherlands Antilles 1.
Magnesium: Metal including alloys, all forms	76	81	72	Canada 5; Spain 4.
Manganese:				
Ore and concentrate	4,603	3,993	1,403	Mexico 2,590.
Oxides	984	1,126	66	Brazil 560; United Kingdom 363; Belgium-Luxembourg 76.
Mercury 76-pound flasks	638	1,363	203	Mexico 841; West Germany 54; Spain 9.
Molybdenum: Metal including alloys, all forms	2	1	--	All from Japan.
Nickel:				
Matte and speiss value, thousands	--	$1	$1	
Metal including alloys:				
Scrap	14	6	6	
Unwrought	121	245	239	Netherlands 4; Canada 1.
Semimanufactures	263	146	73	Canada 32; France 22; West Germany 12.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$11	$13	$11	West Germany $1.
Silver: Metal including alloys, unwrought and partly wrought do	$252	$143	$46	France $41; Italy $11; West Germany $10.
Tin: Metal including alloys, all forms	435	383	4	Bolivia 370; Malaysia 7; Panama 1.
Titanium: Oxides	602	410	30	United Kingdom 179; West Germany 162; France 20.
Tungsten: Metal including alloys, all forms	9	51	51	
Zinc:				
Ore and concentrate value, thousands	$1	$2	$2	
Oxides	275	458	10	Peru 199; Venezuela 195; West Germany 40.
Blue powder	77	29	28	Mainly from West Germany.
Metal including alloys:				
Unwrought	14,598	13,654	7	Peru 11,102; Canada 1,353; Mexico 1,157.
Semimanufactures	17	82	6	Costa Rica 46; Peru 30.
Other:				
Ores and concentrates	395	200	--	United Kingdom 150; West Germany 50.
Oxides and hydroxides	149	146	71	West Germany 41; Bolivia 18; Peru 10.
Base metals including alloys, all forms	47	43	20	Bolivia 13; Peru 6; Hong Kong 2.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	327	150	94	West Germany 50; Spain 6.
Artificial: Corundum	525	NA		
Dust and powder of precious and semiprecious stones value, thousands	$1	$4	$4	
Grinding and polishing wheels and stones	76	60	18	Brazil 16; Italy 11; Spain 10.
Asbestos, crude	27,057	21,492	190	Canada 15,366; Switzerland 2,850; United Kingdom 370.
Barite and witherite	8,010	6,164	--	Peru 5,959; Chile 203; Ireland 2.
Boron materials:				
Crude natural borates	684	461	4	Peru 455; West Germany 2.
Oxides and acids	571	1,448	1,071	Peru 295; Italy 59; France 20.
Cement	10,211	15,383	2,131	Costa Rica 6,771; Peru 2,506; Honduras 1,511.
Chalk	--	9	9	
Clays and clay products:				
Crude	8,056	12,371	11,892	Peru 230; Mexico 131; Japan 80.
Products:				
Nonrefractory	3,587	4,100	181	Italy 2,625; Spain 801; Brazil 399.
Refractory including nonclay brick	13,099	9,165	2,182	Canada 1,381; Austria 1,308; Brazil 964.
Diamond:				
Gem, not set or strung value, thousands	$1	NA		
Industrial do	$4	$9	$8	Switzerland $1.

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diatomite and other infusorial earth	488	1,153	561	Mexico 441; Gibraltar 150.
Feldspar, fluorspar, related materials	1	43	24	France 10.
Fertilizer materials: Manufactured:				
Ammonia	18,635	14,655	1	Netherlands Antilles 9,413; Venezuela 5,219; West Germany 18.
Nitrogenous	224,768	160,181	46,780	Venezuela 85,248; Bulgaria 9,965; Costa Rica 5,000.
Phosphatic	116,837	21,939	21,939	
Potassic	r84,981	97,176	39,819	East Germany 35,967; Spain 16,500; Dominican Republic 4,874.
Unspecified and mixed	--	46,826	43,875	France 2,701; Belgium-Luxembourg 220; West Germany 24.
Graphite, natural	52	41	27	United Kingdom 12; East Germany 1; West Germany 1.
Gypsum and plaster	68,730	66,830	302	Dominican Republic 39,184; Jamaica 27,255; West Germany 43.
Halogens	8	8	5	West Germany 2.
Magnesium compounds: Magnesite	730	492	183	France 191; West Germany 104.
Nitrates, crude	598	81	--	All from West Germany.
Phosphates, crude	40,758	37,849	37,849	
Pigments, mineral: Iron oxides and hydroxides, processed	1,153	1,059	63	West Germany 887; Mexico 47; Spain 43.
Precious and semiprecious stones other than diamond -- value, thousands	$33	$13	$3	Panama $10.
Pyrite, unroasted	2	NA		
Salt and brine	1,217	87	36	Ecuador 35; West Germany 15.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	234	321	21	France 105; Netherlands 89; United Kingdom 16.
Sodium carbonate, natural and manufactured	16,232	37	35	West Germany 2.
Sodium hydroxide	106,786	114,169	53,505	Bermuda 32,800; Peru 7,069; France 6,360.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,576	NA		
Worked	245	NA		
Dolomite, chiefly refractory-grade	9,025	4,222	1,275	Uruguay 1,775; Belgium-Luxembourg 850; Spain 203.
Gravel and crushed rock	1,192	16,345	740	Venezuela 15,428; United Kingdom 111; Italy 42.
Limestone other than dimension	(1)	NA		
Quartz and quartzite	2	9	--	All from Spain.
Sand other than metal-bearing	88	77	57	Sweden 20.
Sulfur:				
Elemental:				
Crude including native and byproduct	46,662	21,907	6,475	Netherlands Antilles 15,333; West Germany 99.
Colloidal, precipitated, sublimed	83	130	128	West Germany 2.
Sulfuric acid	35	56	20	West Germany 29; Sweden 3; United Kingdom 2.
Talc, steatite, soapstone, pyrophyllite	2,377	2,128	1,690	Italy 421; United Kingdom 7; West Germany 6.
Other:				
Crude	31,958	35,258	294	Guadeloupe 30,680; Mexico 1,387; United Kingdom 219.
Oxides and hydroxides of barium, magnesium, strontium	26	229	164	West Germany 39; France 13.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	151	873	22	Venezuela 377; Mexico 306; Honduras 87.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	9	117	31	Venezuela 86.
Carbon: Carbon black	1,093	888	583	West Germany 196; France 56.
Coal: Lignite including briquets	102	90	90	
Gas, natural thousand cubic feet	845	455	35	France 385.
Hydrogen, helium, rare gases	96	77	40	Argentina 34; Italy 3.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	4,951	10,783	427	Venezuela 9,507; Bermuda 407; Ecuador 223.

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products — Continued				
Refinery products:				
Gasoline: Motor thousand 42-gallon barrels	7,589	5,968	1,313	Netherlands Antilles 2,791; Peru 1,382.
Mineral jelly and wax do	26	38	21	West Germany 8; Spain 1.
Kerosine and jet fuel do	258	398	341	West Germany 39; United Kingdom 16.
Distillate fuel oil do	858	4,048	124	Panama 2,887; Venezuela 846; Netherlands Antilles 191.
Lubricants do	254	226	128	Netherlands Antilles 60; Venezuela 29; West Germany 4.
Nonlubricating oils do	18	17	7	Venezuela 10.
Residual fuel oil do	1,137	(2)	--	All from Brazil.
Bituminous mixtures do	NA	(2)	(2)	
Petroleum coke do	1	(2)	(2)	
Unspecified do	2	--		
Tars and other crude chemicals derived from coal, gas, and petroleum	1,737	938	878	United Kingdom 60.

[r]Revised. NA Not available.
[1]Unreported quantity valued at $1,000.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Iron and Steel.—Acerías Paz del Río S.A. (APR), Colombia's largest steel producer, reported losses of $12 million. APR, which employs 7,000 workers, has requested a $60 million loan from a pool of international banks to offset its losses. APR expanded capacity from 200,000 to 400,000 tons per year in 1981, but abandoned plans to expand its capacity to 1 million tons per year in 1982.

A 100,000-ton-per-year electric-furnace steelmaking facility was being planned by the owners of Sanclemente Barco y Compañia Ltda., a steel and oilfield equipment trading firm, in Bogotá. The complex would use either direct-reduced iron or iron smelting technology to feed its electric arc furnaces to make raw steel in billets for domestic consumption.

The Government has set up a dumping tribunal to decide on sanctions against alleged unfair competition from such imported products as steel and electronics. The tribunal is comprised of representatives of the Treasury, Economic Development Ministry, and National Planning Department.

Nickel.—The Cerro Matoso nickel mine, located in the Department of Córdoba, produced 1,000 metric tons of nickel. The entire amount was exported. The Cerro Matoso Mine contains proven reserves of 62 million tons, of which 21 million tons grade an average of 2.7% nickel, and the balance grades 1% to 1.5% nickel.

Precious Metals.—Empresa Colombiana de Minas (ECOMINAS), beginning in 1983, was to spend approximately $12 million on a 2-year project to revitalize the bankrupt Compañia Minera del Chocó S.A., an alluvial gold and platinum mining company. The expenditure was to cover repairs of five dredges, labor costs, working capital requirements, and funds needed for delineation of new reserves. Financing was expected to be acquired through the domestic bank, Banco de la Republica.

NONMETALS

Cement.—Two new cement plants began production in 1982, Cementos Samper and Paz del Rio. The cement industry had a total capacity of about 6 million tons per year, but produced 4.5 million tons. This was an increase of less than 1% over 1981 production. Domestic consumption reached 4.0 million tons while cement exports were in the 500,000-ton range.

Emeralds.—Colombian emerald mines faced stiff competition from low-priced stones from Brazil, Zimbabwe, Mozambique, Tanzania, and particularly Zambia in 1982. Despite a 60% to 70% drop in world market prices, Colombian prices were as high as

they were in 1979, before the emerald price slump began. Colombian emeralds continued to dominate the market for investment gems.

ECOMINAS announced the creation of an exchange devoted to fostering trade in Colombia's precious and semiprecious stones, including agates, jade, turquoise, topaz, onyx, and amethysts. Japan was the largest importer of emeralds and other precious and semiprecious stones.

Phosphate Rock.—A feasibility study costing $4 million was carried out by ECOMINAS in the Pesca and Sardinata phosphate fields of central Colombia. The 2-year study was financed by the Inter-American Development Bank and confirmed 1.2 million tons of phosphate rock grading 18% mineral content at Pesca, Boyacá Department, and 3 million tons at Sardinata, Santander Department.

Increased production would help meet domestic demand, currently at 85,000 tons per year.

MINERAL FUELS

Coal.—The huge coal mining project in El Cerrejón's northern zone, a joint venture of CARBOCOL and Exxon, the U.S. corporation, was proceeding toward a target date of late 1985. The initial annual production was projected at 5 million tons with ultimate production to reach 15 million tons annually.

The El Cerrejón central zone coal mining project, operated by CARBOCOL and a Spanish consortium, began coal production in 1982. Beginning in 1985, 1.5 million tons of coal was projected to be produced annually. Although small in comparison to the projected production of the El Cerrejón north zone, the central zone is an important milestone in north coast energy development. Brought online several years before the north zone project, El Cerrejón central will free gas reserves for other uses.

The Stephens-Adamson Div. of Allis-Chalmers Corp. of the United States was awarded a $57 million contract to design, supply, and build the port coal handling system for the El Cerrejón north project. The system, which was to be built at the Bahia Portete, includes conveyors, two stacker-reclaimers, and a shiploader.

Hydroelectric.—Colombia ranked sixth in the world in hydroelectric potential in 1982. Of this potential, the country was only utilizing about 2% in 1976. Since then, 14 new plants have gone into operation, increasing installed capacity by 56%.

The Government has begun 27 new projects, mostly hydroelectric, that will increase future electric power capacity . One of the projects is the giant Urra Dam that alone will provide 1,050 megawatts. After all this development is completed, the country will still be using only 20% of its total potential.

Natural Gas.—Heavy exploration for more natural gas raised hopes that Colombia could export up to 500 million cubic feet per day for 20 years, possibly some to the United States. Current reserves were estimated at about 4.7 trillion cubic feet. In 1982, Colombia supplied its total consumption of natural gas of 285 million cubic feet. New discoveries in the Department of La Guajira have brightened natural gas production prospects.

Petroleum.—Triton Oil and Gas Corp., a U.S. company, was awarded a 400,000-acre onshore parcel in Casanare Department in the western plains region. Triton shot about 135 line miles of seismic survey lines and had plans to drill its first well in 1983. The company is required to drill eight more wells during the succeeding 6 years. The cost will range from $5 to $18 million per well.

Investment for exploration by private companies and by ECOPETROL went from $150 million in 1981 to over $200 million in 1982 according to the Center of Petroleum Industry Information.

When the pipeline between the eastern plains and the refining center of Barrancabermeja is finished in 1985, approximately 50,000 additional barrels should start flowing from newly discovered wells in Arauca, Trinidad, Cano Garza, Tocaria, and Barquena. Colombia's refining capacity was to increase to 205,000 barrels per day by 1984 when the expansion of the Cartagena refinery was scheduled for completion.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Colombian pesos (Col$) to U.S. dollars at the average exchange rate of Col$64.10=US$1.00.

The Mineral Industry of Cyprus

By Thomas O. Glover[1]

The Republic of Cyprus has been geopolitically divided since 1974. The northern one-third of the island was controlled by the Federated Turkish Cypriots, while the southern two-thirds of the island was controlled by the Government of Cyprus. Very little, if any, mineral activity took place in the northern one-third of the island. Only information relating to the southern sector is presented in this chapter.

Cyprus remained a small nation without energy resources of its own and only modest economically viable mineral resources. These factors, in conjunction with a high inflation rate, created a deficit in the balance of trade.

The economic recovery of Cyprus after the 1974 Turkish intervention continued at a slow pace. Still, the inflation rate had dropped to approximately 7% in 1982 from 14% in 1981. Unemployment was reduced to approximately 3%. Still, construction materials showed a smaller growth than that of the previous year. Metallic ores production was off owing to exhaustion of deposits and reduced world prices.

Ever increasing crude oil prices contributed to the inflation. Cyprus imported all its crude oil from Iraq, Libya, and Algeria, with the major portion coming from Iraq.

The Cyprus Geological Survey Department carried out prospecting for the location of massive sulfide deposits. Chromite deposits known to exist in the Vaslayia area of Cyprus were explored in collaboration with the Bureau de Recherches Géologiques et Minières (BRGM) of France.

PRODUCTION AND TRADE

Copper and zinc mines were idle during the year; however, a small amount of cement copper was produced from an in situ leaching of the Skouriotissa copper ore body. Chromite production remained down owing to the depressed steel markets of the world. The production of nonmetals remained depressed.

Substantial reserves of asbestos, chromite, gypsum, iron pyrites, marble, and building materials were available for mining when required. The production of cement had been a thriving industry for several years. Umber was produced for the raw mineral pigment industries.

The foreign trade situation deteriorated further during the year, with sluggish export growth contrasting with an accelerated rise in imports. As a result, the trade deficit for the year showed a 25% increase over that of 1981. The value of total exports was forecast by Popular Bank to expand 7.5% over that of 1981.

Table 1.—Cyprus: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Chromium ore and concentrate, marketable	15,339	15,742	16,280	10,381	[3]2,878
Copper:					
Mine output, metal content[4]	5,786	1,200	--	--	--
Cement copper	--	--	--	470	[3]1,530
NONMETALS					
Asbestos, fiber produced	[r]34,336	35,472	[r]34,397	24,440	[3]18,952
Cement, hydraulic thousand tons	1,107	1,135	1,233	1,035	[3]1,068
Clays, crude:					
Bentonite	8,500	[r]5,300	[r]23,000	45,000	[3]20,000
Other:					
For brick and tile manufacture thousand tons	[e]200	371	[r]380	167	167
For cement manufacture do	272	274	[r]276	253	250
Unspecified do	--	--	683	550	[3]550
Gypsum:					
Crude	[r]50,700	46,100	43,550	40,000	[3]30,000
Calcined	18,100	15,300	17,850	23,000	[3]25,000
Lime, hydrated	15,000	[e]18,000	13,984	11,320	[3]10,303
Mineral pigments:					
Umber	[r]30,000	26,000	[r]20,000	20,000	NA
Yellow ocher	305	293	200	250	NA
Total	30,305	26,293	[r]20,200	20,250	[3]20,000
Pyrite	[r]122,096	[r]45,987	[r]59,737	15,866	[3]55,125
Salt, marine	3,319	5,870	7,462	9,299	[3]9,857
Stone, sand and gravel:					
Dimension stone: Marble	38,400	52,700	66,200	56,000	[3]75,000
Crushed and broken stone:					
Havara thousand tons	1,000	1,980	[r]5,000	4,350	[3]3,255
Limestone:					
For cement production do	976	993	[r]1,073	1,039	1,000
Other	18,400	[e]20,000	[r]13,984	11,320	10,000
Marl, for cement production	646,111	633,000	600,000	565,387	550,000
Unspecified building stone	63,000	87,100	[r]100,000	20,000	20,000
Sand and aggregate thousand tons	[r]4,000	[r]5,075	[r]4,200	3,857	[3]3,975
Sulfide concentrates containing precious metals	--	--	--	--	[3]116
Sulfur, S content of marketable pyrites	63,000	20,837	24,885	9,478	--
MINERAL FUELS AND RELATED MATERIALS					
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	793	850	857	813	805
Jet fuel and kerosine do	296	296	434	434	377
Distillate fuel oil do	910	986	1,141	1,036	1,019
Residual fuel oil do	861	1,334	1,415	988	1,068
Other:					
Liquefied petroleum gas do	204	256	239	215	193
Asphalt do	97	110	100	148	136
Unspecified do	45	32	3	4	--
Refinery fuel and losses do	130	198	188	220	229
Total do	3,336	4,062	4,377	3,858	3,827

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through June 14, 1983.

[2]In addition to the commodities listed, a variety of other crude construction materials are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Includes the nonduplicative sum of Cu content of all exportable products including copper concentrates, cuprous pyrites, cement copper, and copper precipitates.

Table 2.—Cyprus: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	221	266	--	Netherlands 136; Belgium-Luxembourg 94; Italy 16.
Semimanufactures	138	57	--	Saudi Arabia 35; Iraq 11; Lebanon 3.
Chromium: Ore and concentrate	7,500	10,689	--	United Kingdom 5,089; Belgium-Luxembourg 2,100; Austria 2,000.
Copper:				
Ore and concentrate	825	--		
Metal including alloys:				
Scrap	332	601	--	Greece 167; United Kingdom 88; Israel 81.
Semimanufactures	--	5	--	Oman 2; Jordan 1; United Kingdom 1.
Iron and steel: Metal:				
Scrap	5,877	8,444	--	Greece 7,307; Italy 1,096.
Pig iron, cast iron, ferroalloys	50	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections	106	492	--	Saudi Arabia 359; Iraq 33; Libya 24.
Universals, plates, sheets	54	73	--	Lebanon 66; Iraq 6.
Wire	--	8	--	All to Qatar.
Tubes, pipes, fittings	103	114	--	United Arab Emirates 40; Saudi Arabia 21; Libya 19.
Unspecified	51	--		
Lead:				
Oxides	--	68	--	Saudi Arabia 50; Greece 17.
Metal including alloys:				
Scrap	17	149	--	All to India.
Unwrought	1	--		
Nickel: Metal including alloys, scrap	19	--		
Silver:				
Ore and concentrate value, thousands	$228	$3,095	--	All to West Germany.
Metal including alloys, unwrought and partly wrought do	$17	--		
Tin: Metal including alloys, semimanufactures do	--	$3	--	All to Libya.
Titanium: Oxides	21	--		
Zinc: Metal including alloys:				
Scrap	57	--		
Semimanufactures value, thousands	--	$3	--	All to Oman.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc do	--	$2	--	Mainly to United Arab Emirates.
Grinding and polishing wheels and stones do	--	$8	--	Oman $7.
Asbestos, crude	30,446	29,081	--	Greece 4,693; Egypt 3,408; United Kingdom 3,067.
Cement	656,458	502,521	--	Syria 371,922; Iraq 109,177; Oman 8,500.
Chalk	21	--		
Clays and clay products:				
Crude, unspecified	23,273	26,112	--	Netherlands 5,340; Egypt 4,392; Nigeria 4,154.
Products, refractory including nonclay brick value, thousands	$95	$27	--	Bahrain $12; Greece $7.
Diamond: Gem, not set or strung do	--	$35	--	Lebanon $21; Greece $14.
Fertilizer materials: Manufactured, unspecified	2	--		
Gypsum and plaster	8,148	5,185	--	Saudi Arabia 3,545; Kuwait 1,016.
Lime	--	10	--	All to Lebanon.
Mica: Crude including splittings and waste	1	1	--	All to Greece.
Pigments, mineral: Natural, crude	6,206	6,591	4,939	United Kingdom 1,233.
Precious and semiprecious stones other than diamond value, thousands	--	$7	--	All to India.
Pyrite, unroasted	89,441	35,670	--	Greece 22,800; Yugoslavia 7,870; West Germany 5,000.
Salt and brine	4	--		
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	3	--		
Sodium hydroxide	--	2	--	All to Lebanon.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	27	38	--	Israel 18; Bahrain 11.
Worked value, thousands	--	$76	--	Saudi Arabia $52; Bahrain $24.
Gravel and crushed rock	265	52	--	Bahrain 23; Israel 18.

Table 2.—Cyprus: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Other:				
Crude	--	13	7	United Kingdom 3; Saudi Arabia 1.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value, thousands	$835	$1,158	--	Saudi Arabia $722; United Arab Emirates $121; Kuwait $108.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	--	5	--	All to Libya.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	--	93	--	All to Lebanon.
Gasoline do	70,767	34,088	--	Lebanon 2,590; bunkers 31,498.
Kerosine and jet fuel do	43,521	408,606	--	All for bunkers.
Distillate fuel oil do	97,164	79,920	--	Algeria 743; Lebanon 223; bunkers 78,462.
Lubricants do	r3,829	3,289	--	Lebanon 608; bunkers 2,624.
Residual fuel oil do	416	43,217	--	All for bunkers.
Unspecified value	$213	--		

rRevised.

Table 3.—Cyprus: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	--	1	--	All from United Kingdom.
Metal including alloys, all forms	3,621	2,693	4	Greece 1,217; Hungary 338; United Kingdom 310.
Chromium: Oxides and hydroxides	1	2	--	All from United Kingdom.
Cobalt: Oxides and hydroxides	--	10	--	All from Belgium-Luxembourg.
Copper:				
Sulfate	15	22	--	United Kingdom 15; Italy 2.
Metal including alloys, all forms	602	569	19	United Kingdom 163; Greece 158; Italy 115.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	12,275	18,087	NA	United Kingdom 17,594; West Germany 411.
Iron and steel: Metal:				
Scrap	73	24	--	Lebanon 23.
Pig iron, cast iron, related materials	64	1,020	--	West Germany 1,010; United Kingdom 10.
Ferroalloys	45	58	--	France 38; Finland 10; West Germany 10.
Steel, primary forms	4	3	(1)	Belgium-Luxembourg 2; Austria 1.
Semimanufactures:				
Bars, rods, angles, shapes, sections	63,716	59,058	--	Greece 22,092; Italy 9,258; West Germany 9,245.
Universals, plates, sheets	15,610	19,342	2	Greece 6,170; United Kingdom 5,231; Italy 1,723.
Hoop and strip	2,339	3,020	(1)	Greece 1,996; Israel 703; France 77.
Rails and accessories	38	--		
Wire	2,919	2,919	--	United Kingdom 1,006; Hungary 700; Belgium-Luxembourg 413.
Tubes, pipes, fittings	14,536	13,665	2	Greece 6,545; Italy 1,429; United Kingdom 1,400.
Castings and forgings, rough	37	119	--	Belgium-Luxembourg 99; Sweden 10.
Lead:				
Oxides	108	23	--	United Kingdom 18; France 3.
Metal including alloys, all forms	1,053	728	--	Denmark 681; United Kingdom 40.
Magnesium: Metal including alloys, semimanufactures value, thousands	--	$2	--	United Kingdom $1.
Manganese: Oxides	11	7	--	All from Belgium-Luxembourg.
Mercury value, thousands	--	$2	--	United Kingdom $1.
Metalloids: Unspecified	6	31	--	West Germany 28; Greece 3.

See footnotes at end of table.

Table 3.—Cyprus: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss value, thousands	--	$2	--	All from Spain.
Metal including alloys, all forms	29	6	--	West Germany 2; Canada 1; Israel 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$60	$93	$5	West Germany $74; Australia $6.
Silver: Metal including alloys, and partly wrought ---do---	$933	$1,348	$52	United Kingdom $1,046; West Germany $239.
Tin: Metal including alloys, all forms	7	[2]3	--	United Kingdom 2.
Titanium: Oxides	326	411	--	United Kingdom 199; West Germany 144; Finland 29.
Tungsten: Metal including alloys, all forms ---value, thousands	--	$1	--	All from United Kingdom.
Uranium and/or thorium: Metal including alloys, all forms kilograms	508	--		
Zinc:				
Oxides	24	12	--	Belgium-Luxembourg 9; West Germany 3.
Metal including alloys, all forms[3]	110	50	--	Belgium-Luxembourg 25; Zaire 20.
Other:				
Ores and concentrates:				
Of base metals	133	87	--	Australia 69; Austria 18.
Of precious metals, except gold[4] value	$4,965	--		
Metals including alloys:				
Scrap ---value, thousands	$21	--		
Unwrought and semimanufactures	5	1	(1)	Mainly from United Kingdom.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	r59	20	(1)	Mainly from Italy.
Artificial: Corundum value, thousands	$5	$1	--	All from Belgium-Luxembourg.
Dust and powder of precious and semiprecious stones ---do---	$22	$1	--	All from Israel.
Grinding and polishing wheels and stones ---do---	$260	$191	$1	Italy $59; West Germany $48; Austria $22.
Asbestos, crude	790	366	--	Republic of South Africa 268; Zimbabwe 98.
Barite and witherite	6	5	--	United Kingdom 3.
Boron materials: Oxides and acids	2	3	--	All from West Germany.
Cement	11,411	12,766	--	Greece 6,421; Italy 3,742; United Kingdom 2,512.
Chalk	762	1,013	--	United Kingdom 733; Greece 249.
Clays and clay products:				
Crude, unspecified	1,276	2,007	--	Greece 1,903; United Kingdom 76.
Products:				
Nonrefractory value, thousands	$6,704	$5,865	--	Italy $4,142; United Kingdom $534; Spain $314.
Refractory including nonclay brick ---do---	$694	$1,179	$1	West Germany $888; Greece $125; Spain $70.
Diamond:				
Gem, not set or strung ---do---	$317	$600	--	United Kingdom $375; Belgium-Luxembourg $108; Israel $51.
Industrial ---do---	$3	$18	--	Israel $13; United Kingdom $4.
Diatomite and other infusorial earth	174	123	81	West Germany 41.
Feldspar, fluorspar, related materials	--	20	--	All from West Germany.
Fertilizer materials:				
Crude, unspecified	89	92	--	France 56; Israel 36.
Manufactured:				
Ammonia	25	33	--	Netherlands 16; United Kingdom 7.
Nitrogenous	13,906	16,226	9	Austria 4,351; Italy 4,001; Romania 3,008.
Phosphatic	1,320	18	--	All from Israel.
Potassic	408	671	--	Israel 288; East Germany 200; Belgium-Luxembourg 100.
Unspecified and mixed	16,492	13,488	29	Romania 7,970; France 2,160; Greece 1,658.
Graphite, natural	--	1	--	Mainly from United Kingdom.
Gypsum and plaster	15	18	--	West Germany 12; United Kingdom 4.

See footnotes at end of table.

Table 3.—Cyprus: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Halogens:				
Chlorine	18	16	--	Israel 7; United Kingdom 7.
Unspecified value, thousands	$10	$1	--	All from West Germany.
Magnesium compounds: Magnesite	130	130	--	Netherlands 129.
Mica: Crude including splittings and waste	23	35	--	United Kingdom 22; India 10.
Phosphates, crude	--	18	--	All from Italy.
Pigments, mineral: Iron oxides and hydroxides, processed	37	52	--	United Kingdom 16; Belgium-Luxembourg 13; Italy 13.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$247	$344	--	United Kingdom $198; Israel $59; Thailand $36.
Synthetic do.	$20	$5	--	Switzerland $3.
Salt and brine	365	674	--	United Kingdom 237; Israel 213; Netherlands 191.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	289	212	--	Bulgaria 200; West Germany 12.
Sodium carbonate, manufactured	844	1,508	--	Bulgaria 520; United Kingdom 345; Romania 321.
Sodium hydroxide	600	490	--	West Germany 231; United Kingdom 110; Netherlands 100.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,614	2,720	--	Italy 1,448; Greece 1,230.
Worked value, thousands	$791	$393	--	United Kingdom $307; Greece $42; Pakistan $23.
Dolomite, chiefly refractory-grade	--	49	--	Norway 48.
Gravel and crushed rock	985	1,635	--	Italy 1,566; Greece 65.
Quartz and quartzite	--	298	--	West Germany 164; Greece 132.
Sand other than metal-bearing	596	611	--	West Germany 440; Belgium-Luxembourg 90.
Sulfur:				
Elemental:				
Crude including native and by-product	2,857	1,584	--	Poland 1,411; Lebanon 150.
Colloidal, precipitated, sublimed	40	--		
Sulfuric acid	302	402	--	Greece 363; Netherlands 24.
Talc, steatite, soapstone, pyrophyllite	208	144	--	Greece 50; Norway 50; Italy 29.
Other:				
Crude	(5)	864	--	Greece 853; United Kingdom 8.
Oxides and hydroxides of barium, magnesium, strontium	12	71	--	United Kingdom 70; West Germany 1.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals value, thousands	$1,425	$1,044	--	Greece $744; Italy $240; Canada $36.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	73	355	--	All from Greece.
Carbon: Carbon black	4	7	--	West Germany 4; Belgium-Luxembourg 2.
Coal:				
Briquets of anthracite and bituminous coal	16	40	--	All from Belgium-Luxembourg.
All grades excluding briquets	35	92	--	West Germany 57; Belgium-Luxembourg 35.
Coke and semicoke	201	220	--	Belgium-Luxembourg 200; West Germany 20.
Hydrogen, helium, rare gases	14	3	(1)	Greece 1; Israel 1.
Peat including briquets and litter	1,311	713	--	West Germany 487; Ireland 220.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	4,305	4,302	--	Iraq 2,063; Libya 703; Algeria 692.

See footnotes at end of table.

Table 3.—Cyprus: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products — Continued				
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	171	182	(1)	Greece 81; Italy 46; Saudi Arabia 44.
Gasoline do	17	5	--	Belgium-Luxembourg 2; Greece 1.
Mineral jelly and wax do	4	3	--	France 1; Netherlands 1.
Kerosine and jet fuel do	303	333	--	France 209; Greece 72; Italy 27.
Distillate fuel oil do	51	125	--	Greece 32; United Kingdom 27; Italy 23.
Lubricants do	52	41	1	United Kingdom 13; Belgium-Luxembourg 7; Netherlands 7.
Residual fuel oil do	2,043	1,929	--	U.S.S.R. 925; Italy 385; Ethiopia 191.
Bitumen, other residues, bituminous mixtures do	5	3	(1)	Greece 1; United Kingdom 1.
Tars and other crude chemicals derived from coal, gas, and petroleum	25	37	--	United Kingdom 15; West Germany 11; Israel 9.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]Excludes unreported quantity valued at $8,000.
[3]Totals exclude unreported quantities valued at $31,400 in 1980 and $75,000 in 1981.
[4]May include waste and sweepings.
[5]Unreported quantity valued at $37,000.

COMMODITY REVIEW

METALS

Chromite.—Owing to depressed world steel demand, production of chromite remained low. Most of the production from Cyprus' two operating chromite mines was exported to Europe and the United Kingdom.

NONMETALS

Asbestos.—Only one company, Cyprus Asbestos Mines Ltd., produced asbestos in 1982 from its open pit operation and onsite ore concentration plant at Amiandos. Approximately 19,000 tons of asbestos, equally divided between long and short fiber variety, was mined. Most of the production was shipped to the United Kingdom and Greece.

Bentonite.—Bentonite production was reportedly significantly below that of 1981, owing to reduced demand in its use as an oil well drilling mud.

Cement.—The production of cement remained approximately the same as in 1981, with most of the production being used in Cyprus. Small amounts of the production was exported to nearby Middle East countries.

Fertilizer Materials.—Hellenic Chemical Industries Ltd., a joint venture among four partners, which included the Government of Cyprus, began operating the new sulfuric acid-phosphoric acid fertilizer plant that was completed in 1981. Full production was scheduled at the plant, including 180,000 tons of sulfuric acid, 40,000 tons of phosphoric acid, and 150,000 tons of fertilizer. Approximately one-third of the fertilizer was used locally; the balance was exported.

Umber.—A mineral pigment, umber was produced in large quantities in Cyprus. This naturally occurring brown earth contains ferric oxide, silica, alumina, manganese oxides, and lime. The umber was exported and used locally as paint pigment.

MINERAL FUELS

Petroleum.—Cyprus was fueled almost entirely on petroleum products produced at its sole refinery from imported Iraqi, Libyan, and Saudi Arabian crude petroleum. The refinery, located at Lanarce on the south coast, had a throughput capacity of 16,000 barrels of crude. The refinery produced gasoline, jet fuel, kerosine, distillate fuel oil, residual fuel oil, liquefied petroleum gas, and asphalt.

Like many other countries, Cyprus was caught between worldwide recession and total dependency upon foreign oil and its extremely high cost. Libya, which owed

millions of dollars to Cyprus industry for various products it had purchased, proposed an agreement to settle the debt with oil, at a price 10% higher than the international price. Cyprus also lost about $21.1 million[2] owing to its crude petroleum arrangements with Iraq.

[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Cyprus pounds (£C) to U.S. dollars at the rate of £C1=US$2.11.

The Mineral Industry of Czechoslovakia

By Tatiana Karpinsky[1]

According to Czechoslovak sources,[2] national income in 1982 increased 3.9% in current prices, compared with the 1981 level. The value of gross industrial production increased 1%. Capital investment declined by 3.2% and totaled approximately 138.7 billion korunas (Kcs),[3] or about 8% below the 1980 level. This decline reflected a major goal to reduce the number of started but unfinished projects. Important projects completed included three 210-megawatt units in the Prunerov powerplant and new capacities in the Maxim Gorki and Vrsany Mines in the North Bohemian coal district and Darkov Mine in Ostrava Karvina district, as well as many new facilities in the iron and steel industry.

In 1981, industrial production totaled Kcs649.4 billion.[4] Mining and quarrying contributed 4% of the total industrial production, of which the share of coal was 3%; crude oil, 0.1%; metallic ore, 0.4%; and other mining, 0.5%. Production of refined petroleum contributed 3.7% of the total industrial output; the iron and steel industry, 9.1%; and the nonferrous industry, 2.3%. The number of industrial workers employed in state enterprises in Czechoslovakia totaled 2.9 million in 1981, and the number of employees totaled 2.1 million. The number of workers and employees in state mineral and energy enterprises in 1981 is shown in the following tabulation, by branch:

Branch	Number of workers (thousands)	Number of other employees (thousands)	Number of enterprises
Fuel extraction and processing industry	180	139	55
Power and heat generation	59	39	28
Ferrous metallurgy including ore mining	170	125	14
Nonferrous metallurgy including ore mining	42	30	19

Czechoslovakia was almost entirely dependent on imports for primary nonferrous metals because the domestic raw material base covered, in the main metals, only 5% to 15% of total consumption. Shortages of domestic raw materials provided a strong economic stimulation for recycling and reclaiming. Secondary raw materials were an important source of nonferrous metals.

Government Policies and Programs.—The targets for the 1983 plan were approved by the seventh plenary session of the Communist Party of Czechoslovakia in November 1982. The plan for 1983 included growth targets of 2% in national income and 1.7% in industrial production, to be achieved by increased labor productivity. The plan called for modernization of the iron and steel and the coal industries. Coal extraction and construction of nuclear powerplants were to receive more than 40% of overall capital investment. Coal output would amount to 124 million tons, including 97 million tons of brown coal and lignite. The plan called for an increase in imports of steam coal from Poland and a rise in natural gas and electrical energy deliveries from the U.S.S.R. About 3.23 million tons of new

capacity was to be opened in 1983 in the Ostrava-Karvina bituminous coal district. Steel production was to stay at approximately the same level as in 1981. Production of aluminum, zinc, and tin was to drop slightly from the 1981 level because of the shortage of raw materials. The planned output of refractories and building materials would meet requirements for consumption in Czechoslovakia and for export deliveries.

PRODUCTION

In 1982, the Czechoslovak mining industry produced over 350 million tons of mineral raw materials. In the coal and lignite industry, the state plan was fulfilled. The output plan was not met by the North Bohemian brown coal district, but other brown coal districts surpassed the plan. Output of nonferrous metals decreased by 2.6% compared with that of 1981; production of nonferrous ores decreased 0.4%. Consumption of ferrous and nonferrous metals decreased about 3%. Output of iron and steel was slightly lower than in 1981. Domestic crude oil and gas production continued to be insignificant. Production of electrical energy increased from 73.5 billion kilowatt-hours in 1981 to 74.7 billion kilowatt-hours in 1982, and 2.2 billion kilowatt-hours was imported from the U.S.S.R.

Table 1.—Czechoslovakia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Alumina[e]	100,000	100,000	100,000	100,000	100,000
Aluminum ingot, primary only	36,823	36,889	38,304	37,500	37,000
Antimony:					
Mine output, metal content	[r]500	530	530	500	500
Metal[e]	700	NA	NA	NA	NA
Copper:					
Mine output, metal content	4,700	6,180	6,639	5,218	5,200
Metal:					
Smelter, primary only	6,700	8,180	7,600	7,400	7,400
Refined including secondary	23,810	24,587	25,559	25,513	25,500
Iron and steel:					
Iron ore:					
Gross weight thousand tons	2,023	2,012	1,969	1,935	1,900
Metal content do	607	523	512	502	500
Metal:					
Pig iron do	9,944	9,529	9,819	9,903	[2]9,529
Ferroalloys: Electric furnace do	182	175	173	173	173
Crude steel do	15,294	14,817	15,225	15,270	[2]14,992
Semimanufactures:					
Rolled steel do	10,787	10,781	10,760	10,795	[2]10,665
Pipes and tubes	1,510	1,536	1,542	1,528	1,500
Lead:					
Mine output, metal content	3,981	4,026	3,349	3,400	3,400
Metal including secondary	19,042	19,020	20,014	20,663	20,000
Manganese ore, gross weight[3]	900	900	900	900	900
Mercury 76-pound flasks	5,686	4,960	6,236	8,383	8,500
Nickel metal, primary	[e]2,200	2,202	2,241	2,200	2,200
Silver[e] thousand troy ounces	1,300	1,300	1,300	1,300	1,300
Tin:					
Mine output, metal content	180	180	322	433	400
Metal including secondary	120	120	215	289	250
Tungsten: Mine output, metal content[e]	80	80	80	50	50
Zinc:					
Mine output, metal content	8,772	8,799	7,239	6,790	7,000
Metal including secondary	[e]11,500	11,500	9,600	9,004	9,000
NONMETALS					
Barite	[e]65,000	67,800	61,052	61,000	61,000
Cement, hydraulic thousand tons	10,204	10,258	10,546	10,646	[2]10,325
Clays: Kaolin do	499	513	518	508	500
Fluorspar[e]	96,000	96,000	96,000	96,000	96,000
Graphite[e] thousand tons	45	45	45	45	45
Gypsum and anhydrite, crude do	697	734	757	767	750

See footnotes at end of table.

Table 1.—Czechoslovakia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Lime, hydrated, and quicklime _ thousand tons	3,078	2,968	3,018	3,234	3,100
Magnesite, crude do	658	654	666	664	660
Nitrogen: N content of ammonia do	809	801	844	850	850
Perlite	[e]20,000	[e]30,000	40,302	42,336	42,000
Pyrites, gross weight thousand tons	134	140	[e]140	140	140
Salt do	258	271	277	311	300
Sodium compounds:					
Caustic soda do	311	312	325	331	330
Sodium carbonate, manufactured do	121	119	123	118	120
Stone:					
Limestone and other calcareous stone do	23,174	23,209	23,884	24,155	24,000
Quarry stone, not further described thousand cubic meters	34,368	35,280	36,499	36,220	36,200
Sulfur:[e]					
Native thousand tons	5	5	5	5	5
From pyrites do	60	60	60	60	60
Byproduct, all sources do	10	10	10	10	10
Total do	75	75	75	75	75
Sulfuric acid do	1,195	1,253	1,284	1,317	1,700
MINERAL FUELS AND RELATED MATERIALS					
Carbon: Carbon black[e]	30,000	30,000	30,000	30,000	30,000
Coal:					
Bituminous thousand tons	27,799	27,967	27,710	27,007	[2]27,463
Brown do	92,450	93,731	92,529	93,096	[2]97,096
Lignite do	3,269	3,201	3,197	3,269	3,000
Total do	123,518	124,899	123,436	123,372	[2]127,559
Coke:					
Metallurgical do	8,809	8,569	8,611	8,575	8,500
Unspecified do	1,976	1,889	1,712	1,748	1,900
Total do	10,785	10,458	10,323	10,323	10,400
Fuel briquets from brown coal do	1,130	1,117	1,159	1,069	1,100
Gas:					
Manufactured, all types _ million cubic feet	282,136	275,983	274,360	268,639	270,000
Natural, marketed[4] do	26,129	[e]26,000	26,000	26,000	26,000
Petroleum and refinery products:					
Crude:					
As reported thousand tons	117	108	93	89	90
Converted _ thousand 42-gallon barrels	793	732	629	603	602
Refinery products:[5]					
Gasoline do	13,917	14,790	12,903	12,200	NA
Kerosine do	3,658	3,759	4,084	3,640	NA
Distillate fuel oil do	31,670	33,167	30,922	30,370	NA
Residual fuel oil do	58,484	61,552	62,577	61,800	NA
Lubricants do	[e]1,925	[e]1,936	2,555	2,500	NA
Other:					
Liquefied petroleum gas do	[e]1,720	[e]1,694	[e]1,694	[e]1,694	NA
Asphalt and bitumen do	[e]7,880	[e]7,986	[e]7,986	[e]7,986	NA
Paraffin wax do	[e]120	[e]121	[e]121	[e]121	NA
Total do	119,374	125,005	122,842	120,311	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Jan. 31, 1983. In addition to the commodities listed, arsenic, gold, uranium, feldspar, graphite, and a variety of other petroleum products are produced, but information is inadequate to make reliable estimates of output levels.

[2]Reported figure.

[3]This material, although reported as manganese ore, is believed to be manganiferous iron ore with a manganese content of about 17% and as such is not equivalent to material ordinarily reported as manganese ore, which generally contains 25% or more manganese.

[4]Includes gas produced from coal mines. Gross output of natural gas is not reported, but it is believed to exceed reported marketed output by a relatively inconsequential amount.

[5]Data presented are for those products reported in official Czechoslovak sources and in United Nations publications; no estimates have been included for other products or for refinery fuel and losses.

TRADE

Czechoslovakia accounted for 0.7% of all world trade in 1982; its share of East European trade amounted to 8%. Sharp reductions in imports, especially from market economy countries permitted Czechoslovakia to record a hard-currency trade surplus. Trade with the U.S.S.R. and other centrally planned economy countries was up by more than 13% overall, accounting for about 75% of total trade.

In 1981, exports of fuels, mineral raw materials, and metals contributed 27% of total exports, valued at Kcs95.5 billion. Fuels, mineral raw materials, and metals accounted for 53% of total imports, valued at Kcs94.2 billion. The U.S.S.R. accounted for 93% of Czechoslovak imports of crude oil, 83% of iron ore, almost 100% of natural gas, and a large quantity of nonferrous metals.

The trade agreement between Czechoslovakia and the U.S.S.R. for 1983 was signed in Moscow on December 2, 1982. The volume of the exchange of commodities was to exceed $10.5 billion, an increase of 12% compared with that of 1982. The supplies of the basic types of raw materials such as crude oil, natural gas, hard-coal electrical energy, iron ore, and metals will continue. Czechoslovakia was to export to the U.S.S.R. machinery and equipment and large-diameter steel pipes.

Czechoslovakia and the U.S.S.R. signed an agreement for 1981-85 covering U.S.S.R. exports of 5 million tons of pig iron in exchange for Czechoslovak large-diameter pipes and other steel products. The deal is worth 1,500 million rubles.[5] In October, Czechoslovakia signed a long-term agreement with Brazil for import of Brazilian iron ore, and in December, an agreement was signed for delivery of iron ore from India. During 1981-85, Czechoslovakia will continue to participate in the construction of the Khmelnits nuclear powerplant in the U.S.S.R.

Table 2.—Czechoslovakia: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	36	NA		
Metal including alloys:				
Scrap	3,301	3,565	--	Austria 2,816; West Germany 555.
Unwrought	10,079	8,420	--	Japan 8,120; Hungary 278.
Semimanufactures	5,301	1,148	--	Hungary 1,022; United Arab Emirates 103.
Antimony: Metal including alloys, all forms	12	NA		
Chromium: Oxides and hydroxides	16	NA		
Cobalt: Metal including alloys, all forms kilograms	--	100	--	All to Spain.
Copper:				
Ore and concentrate	520	536	--	All to United Kingdom.
Sulfate	1,889	1,553	--	Italy 772; West Germany 452; Sweden 163.
Ash and residue containing copper	NA	367	--	All to West Germany.
Metal including alloys:				
Scrap	1,385	784	--	Austria 279; West Germany 240; Sweden 198.
Unwrought	559	NA		
Semimanufactures	443	14	--	Yugoslavia 9; West Germany 2.
Gallium: Metal including alloys, all forms kilograms	--	200	--	All to West Germany.
Germanium: Metal including alloys, all forms do.	100	NA		
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	334	--	All to West Germany.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate including roasted pyrite	28,474	11,586	--	All to Hungary.
Metal:				
Scrap	99,490	102,718	--	Italy 59,883; Austria 22,902; West Germany 16,727.
Pig iron, cast iron, related materials	3,839	3,509	--	Sweden 1,398; West Germany 1,159; Norway 241.
Ferroalloys:				
Ferrochromium	NA	5,117	--	Austria 3,423; West Germany 1,165; Italy 460.
Ferromanganese	NA	6,858	--	Hungary 6,700.
Ferrosilicomanganese	NA	14,752	--	West Germany 12,840; Italy 1,513.
Ferrosilicon	NA	479	--	Austria 458.
Unspecified	36,839	5,017	--	Austria 2,100; United Kingdom 1,945; Hungary 497.
Steel, primary forms[2] thousand tons	408	308	--	Yugoslavia 171; Italy 54; Spain 17.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	[3]1,234	[3]1,213	([4])	West Germany 166; Egypt 98; East Germany 92.
Universals, plates, sheets do	[3]902	[3]958	([4])	Yugoslavia 126; West Germany 98; Poland 92.
Hoop and strip do	[3]223	[3]208	--	Greece 11; West Germany 10; Yugoslavia 9; undetermined 161.
Rails and accessories[3] do	22	37	--	NA.
Wire do	[3]114	[3]110	([4])	West Germany 17; Hungary 16; Yugoslavia 15.
Tubes, pipes, fittings[2] do	551	549	13	U.S.S.R. 392; Poland 31; East Germany 26.
Castings and forgings, rough do	[3]27	[3]22	--	Poland 10.
Unspecified do	1,296	446	--	Yugoslavia 263; East Germany 111.
Lead:				
Ore and concentrate	5,998	5,749	--	All to West Germany.
Metal including alloys:				
Scrap	--	88	--	West Germany 60; Austria 28.
All forms	55	NA		
Magnesium: Metal including alloys:				
Scrap	15	6	--	All to West Germany.
Semimanufactures kilograms	296	NA		
Manganese: Oxides	--	22	--	All to Italy.
Nickel:				
Oxides and hydroxides	NA	12	--	All to West Germany.
Metal including alloys:				
Scrap	250	NA		
Semimanufactures	3	3	--	Sweden 2; France 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$232	$432	--	West Germany $416.
Silver:				
Waste and sweepings[5] do	$5	$269	--	All to West Germany.
Metal including alloys, unwrought and partly wrought do	$1,781	$3,021	--	Italy $1,641; United Kingdom $1,378.
Tin:				
Ore and concentrate	--	47	--	All to United Kingdom.
Metal including alloys, semimanufactures	1	([4])	--	All to West Germany.
Titanium: Oxides	2,125	772	--	Italy 420; United Kingdom 312.
Tungsten: Metal including alloys, all forms kilograms	46	NA		
Zinc:				
Ore and concentrate	8,397	13,648	--	Yugoslavia 6,385; West Germany 5,086; Austria 2,117.
Oxides	725	204	--	West Germany 122; Belgium-Luxembourg 40; Italy 35.
Ash and residue containing zinc	NA	4,044	--	All to West Germany.
Metal including alloys:				
Scrap	226	192	--	Do.
Unwrought	150	16	--	All to Denmark.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc —Continued				
Metal including alloys —Continued				
Semimanufactures	146	NA		
Other:				
Ores and concentrates	300	NA		
Oxides and hydroxides	25	35	--	All to Austria.
Ashes and residues	3,695	1,105	--	Belgium-Luxembourg 509; Austria 492.
Base metals including alloys, all forms[6]	23	26	--	Austria 19; United Kingdom 5.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	36	20	--	All to Sweden.
Artificial:				
Corundum	4,468	4,248	--	Italy 3,056; West Germany 854; Netherlands 320.
Silicon carbide	NA	616	--	All to West Germany.
Grinding and polishing wheels and stones[7]	892	506	--	West Germany 150; Italy 85; Canada 55.
Asbestos, crude	--	99	--	United Kingdom 52; Yugoslavia 47.
Barite and witherite	5,487	1,258	--	Austria 1,011; Yugoslavia 215.
Cement[2] thousand tons	341	429	--	West Germany 142; Hungary 103; Yugoslavia 103.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	23,494	24,718	--	All to Austria.
Chamotte earth	77,967	145,028	--	Hungary 65,873; West Germany 41,739; Italy 19,703.
Fire clay	36,097	73,160	--	West Germany 37,774; Yugoslavia 35,386.
Kaolin[2] thousand tons	367	347	--	West Germany 132; Poland 65; Austria 46.
Unspecified	166,454	136,659	--	West Germany 60,525; Hungary 53,348; Norway 8,338.
Products:				
Nonrefractory	24,631	21,955	46	West Germany 6,640; Yugoslavia 5,656; Austria 2,310.
Refractory including nonclay brick	49,629	[8]45,014	--	West Germany 20,938; France 2,887; Sweden 2,837.
Diamond:				
Gem, not set or strung value, thousands	$14	$3	--	All to Belgium-Luxembourg.
Industrial do	$361	$91	--	Belgium-Luxembourg $85.
Diatomite and other infusorial earth	996	1,244	--	All to Austria.
Feldspar, fluorspar, related materials, unspecified	20	300	--	All to Yugoslavia.
Fertilizer materials:				
Crude, n.e.s	--	12	--	All to West Germany.
Manufactured:				
Ammonia	16,489	15,771	--	Austria 10,219; West Germany 5,552.
Nitrogenous	90,571	103,918	--	Yugoslavia 50,279; West Germany 25,851; Poland 19,000.
Phosphatic	3,460	NA		
Potassic	5,420	3,146	--	United Kingdom 3,100.
Unspecified and mixed	508	435	--	Yugoslavia 375; Denmark 40.
Graphite, natural	951	1,573	--	Yugoslavia 883; Poland 540; Greece 145.
Gypsum and plaster	27	82	--	All to Austria.
Halogens:				
Chlorine	NA	40	--	All to Yugoslavia.
Unspecified	--	14	--	All to Italy.
Lime	8,349	9,891	--	Hungary 9,291; West Germany 600.
Magnesium compounds: Magnesite[2] thousand tons	385	305	--	Hungary 72; Poland 62; West Germany 57.
Mica: Worked including agglomerated splittings	93	94	--	Yugoslavia 49; Austria 15; United Kingdom 12.
Nitrates, crude	467	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	1,340	1,062	--	All to Italy.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ____ value, thousands	$23	$42	--	Canada $18; West Germany $13; United Arab Emirates $7.
Synthetic ____ do ____	$101	$39	--	Yugoslavia $22; West Germany $17.
Salt and brine	2,029	101	--	All to Yugoslavia.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	654	1,045	--	Yugoslavia 340; Italy 244; West Germany 151.
Sodium carbonate, natural and manufactured	[9]8,200	[9]5,900	--	Mainly to West Germany.
Sodium hydroxide	[9]19,200	[9]23,400	--	Yugoslavia 14,150; West Germany 8,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,115	1,543	--	West Germany 1,332; Austria 181.
Worked	9,988	7,850	--	West Germany 7,661; Netherlands 144.
Dolomite, chiefly refractory-grade	--	20	--	All to France.
Gravel and crushed rock	2,706	8,949	--	West Germany 6,967; Austria 1,922.
Limestone other than dimension	21,614	20,338	--	All to West Germany.
Sand other than metal-bearing	277,260	262,078	--	Austria 164,565; Hungary 97,316.
Sulfur:				
Elemental, crude including native and byproduct	1,577	26	--	All to Austria.
Sulfuric acid[9]	8,600	9,000	--	NA.
Talc, steatite, soapstone, pyrophyllite	6,627	6,395	--	Poland 6,350; Yugoslavia 25; Italy 20.
Other:				
Crude	25,130	24,368	--	Hungary 13,462; West Germany 5,633; Austria 4,829.
Slag and dross, not metal-bearing	24,300	17,171	--	All to West Germany.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	92,249	--	West Germany 26,268; Yugoslavia 23,720; Poland 13,555.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	10	NA		
Coal:				
Anthracite and bituminous[2] thousand tons	3,728	2,605	--	East Germany 597; Austria 540; Hungary 469.
Briquets of anthracite and bituminous coal	408	100	--	All to Greece.
Lignite including briquets[2] thousand tons	2,160	2,527	--	West Germany 2,464.
Coke and semicoke[2] ____ do ____	1,461	1,263	--	East Germany 500; Austria 401; Romania 161.
Gas, natural ____ million cubic feet	[9]1,607	[9]1,201	--	Hungary 69; undetermined 1,132.
Peat including briquets and litter	20	NA		
Petroleum and refinery products:				
Crude[9] thousand 42-gallon barrels	2,224	1,417	--	NA.
Refinery products:				
Liquefied petroleum gas do ____	926	913	--	West Germany 580; Italy 177; Netherlands 124.
Gasoline ____ do ____	[9]2,440	1,663	--	West Germany 1,071; Netherlands 200; France 199.
Mineral jelly and wax -- do ____	--	1	--	Mainly to Yugoslavia.
Kerosine and jet fuel -- do ____	339	413	--	West Germany 324; Yugoslavia 57; Hungary 16.
Distillate fuel oil ____ do ____	[9]3,999	[9]4,409	--	West Germany 553; Switzerland 488; undetermined 3,281.
Lubricants ____ do ____	[9]75	353	--	Austria 147; Denmark 131; Yugoslavia 73.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Residual fuel oil thousand 42-gallon barrels	2,458	3,275	--	West Germany 1,653; Austria 1,532.
Bitumen and other residues do	15	14	--	Austria 13.
Tars and other crude chemicals derived from coal, gas, and petroleum	47,874	34,248	--	West Germany 14,648; Italy 8,156; Switzerland 7,837.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Czechoslovakia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from various sources, which include United Nations information, data published by the partner trade countries, and partial official trade sources of Czechoslovakia.

[2]Official trade statistics of Czechoslovakia.

[3]Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[4]Less than 1/2 unit.

[5]May include other precious metals.

[6]Excludes quantity valued at $20,000 in 1980 and $46,000 in 1981.

[7]Excludes quantity valued at $284,000 in 1980 and $445,080 in 1981 including imports of United States valued at $93,000 in 1981.

[8]Excludes quantity valued at $66,498.

[9]Statistical Yearbook of Member States of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

Table 3.—Czechoslovakia: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	22	22	--	West Germany 18; Austria 3.
Aluminum:				
Ore and concentrate[2] thousand tons	466	454	--	Hungary 328; Yugoslavia 126.
Oxides and hydroxides	29,520	32,259	--	Yugoslavia 16,716; Hungary 15,447.
Metal including alloys:				
Scrap	--	518	--	West Germany 314; Austria 200.
Unwrought[2] thousand tons	93	82	--	U.S.S.R. 68; Hungary 5; Yugoslavia 5.
Semimanufactures	18,322	15,988	--	Yugoslavia 14,068; Hungary 964; Austria 453.
Beryllium: Metal including alloys, all forms	(3)	14	--	All from West Germany.
Cadmium: Metal including alloys, all forms[2]	206	228	--	Japan 60; China 40; Finland 40.
Chromium:				
Ore and concentrate[2] thousand tons	182	180	--	U.S.S.R. 130; Albania 24.
Oxides and hydroxides	2	683	--	U.S.S.R. 673.
Metal including alloys, all forms	--	15	--	All from France.
Cobalt:				
Oxides and hydroxides	19	10	--	All from West Germany.
Metal including alloys, all forms	29	40	--	Finland 25; France 15.
Columbium and tantalum: Metals including alloys, all forms, columbium (niobium) kilograms	158	341	--	All from West Germany.
Copper:				
Ore and concentrate	--	2,300	--	Norway 1,300; Morocco 1,000.
Sulfate	(3)	--		
Metal including alloys:				
Scrap	142	632	--	Austria 360; West Germany 272.
Unwrought[2] thousand tons	63	67	--	U.S.S.R. 39; United Kingdom 13; Poland 10.
Semimanufactures	23,529	25,366	--	Poland 19,725; Yugoslavia 4,114; West Germany 641.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	367	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	12,819	12,166	--	U.S.S.R. 9,657; Brazil 1,346; India 398.

See footnotes at end of table.

Table 3.—Czechoslovakia: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Scrap	228,092	252,097	--	U.S.S.R. 198,758; West Germany 53,339.
Pig iron, cast iron, related materials	809,000	843,000	--	U.S.S.R. 839,000.
Ferroalloys:				
Ferrochromium	NA	6,122	--	Sweden 3,275; West Germany 2,467.
Unspecified	6,496	3,407	--	West Germany 1,153; Belgium-Luxembourg 888; France 873.
Steel, primary forms[4]	36,000	20,000	--	NA.
Semimanufactures:[4]				
Bars, rods, angles, shapes, sections thousand tons	120	172	--	Poland 122; undetermined 39.
Universals, plates, sheets do	136	108	(3)	West Germany 21; Poland 10; undetermined 73.
Hoop and strip do	23	23	--	Yugoslavia 5; West Germany 2; undetermined 12.
Rails and accessories do	4	1	--	NA.
Wire do	3	3	(3)	Yugoslavia 2; West Germany 1.
Tubes, pipes, fittings do	16	16	(3)	West Germany 9; Austria 1; Japan 1.
Castings and forgings, rough do	18	12	--	Yugoslavia 2; Poland 1; undetermined 9.
Lead:				
Oxides	4,007	4,142	--	France 2,218; Austria 1,919.
Metal including alloys:				
Scrap	--	253	--	All from West Germany.
Unwrought[2] thousand tons	40	38	--	U.S.S.R. 20; Yugoslavia 8.
Semimanufactures	4	(3)	--	Mainly from Yugoslavia.
Magnesium: Metal including alloys:				
Scrap	--	(3)	--	All from West Germany.
Unwrought	(5)	254	--	All from France.
Semimanufactures	10	6	--	West Germany 5.
Manganese:				
Ore and concentrate, metallurgical-grade[2] thousand tons	525	480	--	U.S.S.R. 332; Brazil 94; India 16.
Oxides	21	(6)	(6)	
Metal including alloys, all forms	49	22	--	All from Sweden.
Mercury 76-pound flasks	1,363	2,001	--	All from Norway.
Metalloids:				
Silicon	NA	2,239	--	Norway 2,189; West Germany 50.
Unspecified	7,184	4,607	--	France 4,605.
Molybdenum:				
Ore and concentrate	533	716	--	Belgium-Luxembourg 677; West Germany 39.
Metal including alloys, all forms	8	11	(3)	All from United Kingdom.
Nickel: Metal including alloys:				
Unwrought[2]	7,919	8,347	--	U.S.S.R. 4,344; Cuba 1,891; United Kingdom 1,228.
Semimanufactures	51	43	--	West Germany 32; Netherlands 4; Switzerland 3.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$8,920	$1,793	--	United Kingdom $1,037; West Germany $668.
Silver: Metal including alloys, unwrought and partly wrought do	$26,411	$10,374	--	Yugoslavia $7,092; Spain $2,009; Netherlands $1,123.
Tin: Metal including alloys:				
Unwrought[2]	4,085	3,646	--	United Kingdom 1,046; Indonesia 899; Bolivia 892.
Semimanufactures	1	(3)	--	Mainly from West Germany and Switzerland.
Titanium:				
Ore and concentrate	400	--		
Oxides	893	678	--	West Germany 663; United Kingdom 15.
Metal including alloys, all forms	1	1	--	All from West Germany.
Tungsten:				
Ore and concentrate	248	52	--	All from Netherlands.
Metal including alloys, all forms	1	(3)	(3)	Mainly from United Kingdom.
Uranium and/or thorium: Metal including alloys, all forms value, thousands	--	$1	--	All from United Kingdom.

See footnotes at end of table.

Table 3.—Czechoslovakia: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Vanadium: Oxides and hydroxides value, thousands	NA	$25,756	--	Finland $25,468; Belgium-Luxembourg $288.
Zinc:				
Oxides	324	645	--	All from United Kingdom.
Metal including alloys:				
Unwrought[2] thousand tons	67	63	--	United Kingdom 14; Yugoslavia 13; U.S.S.R. 9.
Semimanufactures	6,040	7,772	--	Yugoslavia 6,322; Poland 1,449.
Other:				
Ores and concentrates	200,107	50,929	--	Norway 50,724; Netherlands 195.
Oxides and hydroxides	1,805	2,238	33	Sweden 1,294; Austria 799; West Germany 74.
Base metals including alloys, all forms	20	91	--	Austria 44; Finland 40; West Germany 6.
Nonferrous metals and alloys, rolled[2]	19,000	14,000	--	All from U.S.S.R.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	436	725	--	All from Italy.
Artificial: Corundum	1,923	1,524	--	Yugoslavia 1,492; West Germany 25.
Dust and powder of precious and semi-precious stones, including diamond value, thousands	$410	$260	$144	United Kingdom $116.
Grinding and polishing wheels and stones[7]	452	472	3	West Germany 270; Austria 144; United Kingdom 26.
Asbestos, crude[2]	46,197	49,195	--	U.S.S.R. 35,987; Canada 4,461; Botswana 1,858.
Barite and witherite	3,707	2,973	--	All from West Germany.
Boron materials:				
Crude natural borates	13,656	8,871	--	Netherlands 5,208; Italy 3,663.
Oxides and acids	2,153	1,751	--	France 1,523; West Germany 168; Italy 40.
Cement[2] thousand tons	534	58	--	East Germany 42; U.S.S.R. 12.
Chalk	1,552	1,603	--	Belgium-Luxembourg 843; France 606.
Clays and clay products:				
Crude:				
Bentonite	--	1,738	--	All from Hungary.
Chamotte earth	453	399	--	All from Poland.
Kaolin	4,774	5,060	--	Hungary 4,963; Netherlands 97.
Unspecified	3,540	400	--	West Germany 299; France 101.
Products:				
Nonrefractory	2,167	1,506	--	Italy 1,144; West Germany 323.
Refractory including nonclay brick	14,541	15,757	--	West Germany 6,613; Poland 4,332; Austria 1,190.
Diamond:				
Gem, not set or strung value, thousands	$817	$24	$1	Belgium-Luxembourg $22.
Industrial do	$3,405	$3,548	--	Belgium-Luxembourg $2,066; United Kingdom $1,147; Switzerland $327.
Diatomite and other infusorial earth	804	348	--	France 179; Austria 161.
Feldspar, fluorspar, related materials:				
Feldspar	NA	800	--	All from Yugoslavia.
Fluorspar	NA	150	--	All from West Germany.
Unspecified	1,995	1,563	--	Finland 1,113; France 431.
Fertilizer materials:				
Crude, n.e.s	--	8,916	--	Austria 8,896.
Manufactured:				
Ammonia	--	4,952	--	All from Hungary.
Nitrogenous, N_2 content[2] thousand tons	100	112	--	U.S.S.R. 110.
Phosphatic, P_2O_5 content[8] do	153	97	--	NA.
Potassic, K_2O content do	578	639	--	East Germany 471; U.S.S.R. 168.
Unspecified and mixed	2,206	15,174	--	Austria 15,144.
Graphite, natural	209	765	--	Japan 484; West Germany 213; Austria 45.
Gypsum and plaster[2] thousand tons	25	22	--	All from East Germany.
Halogens:				
Iodine	9	13	--	All from France.
Unspecified	40	6	--	All from Netherlands.
Lime	48	67	--	All from West Germany.
Magnesium compounds:				
Oxides and hydroxides	NA	461	--	France 312; West Germany 149.

See footnotes at end of table.

Table 3.—Czechoslovakia: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Magnesium compounds —Continued				
Other	[9]2,203	438	--	Austria 346; Greece 59; West Germany 30.
Mica:				
Crude including splittings and waste	270	195	--	All from France.
Worked including agglomerated splittings	34	33	--	Austria 27; Switzerland 5.
Nitrates, crude	992	NA		
Phosphates, crude P_2O_5 content[2] thousand tons	323	271	--	U.S.S.R. 159; Morocco 39; Tunisia 28.
Pigments, mineral: Iron oxides and hydroxides, processed	2,294	1,525	--	West Germany 1,259; Italy 156; United Kingdom 105.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$199	$61	--	West Germany $52; France $9.
Synthetic do	$51	$65	--	All from Switzerland.
Pyrite, unroasted	50	110	--	All from Italy.
Salt and brine	178,799	352,808	--	U.S.S.R. 314,189; West Germany 26,787.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassium peroxides	--	30	--	All from United Kingdom.
Sodium carbonate, natural and manufactured[2] thousand tons	287	171	--	East Germany 58; Romania 48; Bulgaria 43.
Sodium hydroxide	[8]100	[10]35	([10])	All from West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	16,976	14,218	--	Yugoslavia 11,497; Hungary 2,671.
Worked	[11]2,755	[11]490	--	Yugoslavia 447; Italy 33.
Dolomite, chiefly refractory-grade	253	197	--	All from West Germany.
Gravel and crushed rock	3,747	1,639	--	France 1,015; Yugoslavia 393; Denmark 90.
Limestone other than dimension	--	1	--	All from West Germany.
Quartz and quartzite	5,061	3,215	--	Do.
Sand other than metal-bearing[12]	1,900	1,023	--	West Germany 654; Hungary 333.
Sulfur:				
Elemental:				
Crude including native and byproduct[2] thousand tons	485	537	--	Poland 456; West Germany 32.
Colloidal, precipitated, sublimed	57	51	--	Italy 50.
Dioxide	446	632	--	All from West Germany.
Sulfuric acid[2]	66,258	42,122	--	U.S.S.R. 32,711; East Germany 9,411.
Talc, steatite, soapstone, pyrophyllite	262	317	--	Norway 121; West Germany 63; Austria 60.
Other:				
Crude	9,757	8,415	--	Hungary 7,236; West Germany 965; Finland 173.
Slag and dross, not metal-bearing	80	2,278	--	All from Austria.
Oxides and hydroxides of barium, magnesium, strontium	16	5	--	West Germany 3; France 2.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	652	--	West Germany 458; Netherlands 153; Belgium-Luxembourg 22.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	70	44	--	All from West Germany.
Carbon: Carbon black[2]	36,406	31,878	--	U.S.S.R. 18,006; Romania 3,903; Austria 2,489.
Coal:[2]				
Anthracite and bituminous thousand tons	5,058	4,423	--	U.S.S.R. 3,273; Poland 1,086.
Lignite including briquets do	439	570	--	All from East Germany.
Coke and semicoke	360	[8]15,900	--	NA.
Gas, natural million cubic feet	294,099	301,729	--	All from U.S.S.R.
Hydrogen, helium, rare gases	5	[13]6	--	All from Yugoslavia.
Peat including briquets and litter	49	17	--	All from United Kingdom.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	[2]141,690	[8]135,975	--	Mainly from U.S.S.R.
Refinery products:				
Liquefied petroleum gas do	57	12	--	Austria 11.
Gasoline[6] do	3,417	3,647	--	NA.
Mineral jelly and wax do	11	11	--	West Germany 9; Hungary 1.
Kerosine and jet fuel do	68	93	--	West Germany 56; Greece 27.

See footnotes at end of table.

Table 3.—Czechoslovakia: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[P]	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Distillate fuel oil[8] thousand 42-gallon barrels	1,440	1,910	--	NA.
Lubricants do	[8]139	277	(3)	Austria 183; Yugoslavia 52; West Germany 24.
Nonlubricating oils do	(3)	1	(3)	All from West Germany.
Residual fuel oil do	462	862	--	Hungary 689; West Germany 171.
Bitumen and other residues do	--	1	--	Mainly from West Germany.
Bituminous mixtures do	1	2	--	Austria 1; Netherlands 1.
Petroleum coke do	20	3	--	All from West Germany.
Tars and other crude chemicals derived from coal, gas, and petroleum	3,664	3,002	--	West Germany 2,499; Netherlands 483.

[P]Preliminary. NA Not available.

[1]Owing to the lack of official trade data published by Czechoslovakia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from various sources, which include United Nations information, data published by the partner trade countries, and partial official trade sources of Czechoslovakia.

[2]Official trade statistics of Czechoslovakia.

[3]Less than 1/2 unit.

[4]Source for total imports only: Quarterly Bulletin of Steel Statistics, Europe, United Nations, New York.

[5]1980 imports were valued at $54,000.

[6]1981 imports were valued at $17,000, all of which came from the United States.

[7]Excludes quantity valued at $194,000 from 1980 and $182,000 in 1981.

[8]Statistical Yearbook of Member States of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

[9]Excludes exports from Canada valued at $17,000.

[10]Excludes exports from United States valued at $17,000.

[11]Excludes exports from Pakistan valued at $200,000 in 1980 and $472,000 in 1981.

[12]In addition, Hungary exported 267,544 cubic meters of construction sand in 1980 and 291,041 cubic meters in 1981.

[13]Excludes exports of 2,780 thousand cubic feet of rare gases from Austria.

COMMODITY REVIEW

METALS

Aluminum.—Czechoslovakia's aluminum reduction plant, with an estimated capacity of 60,000 tons per year, located at Ziar nad Hronom in Central Slovakia, operated on imported bauxite from Hungary and Yugoslavia. In 1982, total imports of bauxite amounted to 450,000 tons. The Bayer-process alumina plant also extracted gallium.

Antimony.—A new antimony installation, with a capacity of 2,000 tons per year, was put on a trial basis at Vazscora in Central Slovakia in April 1982. New equipment will process low-grade concentrates that are mainly byproducts of mercury production; the concentrates also contain copper, antimony, bismuth, mercury, and arsenic that are not recovered. In 1982, the enterprise was producing at the rate of 1,000 tons of antimony per year.

Copper.—Imports of copper metal from the U.S.S.R., the United Kingdom, and Poland supplied the main requirements of Czechoslovakia's industry. Copper consumption in Czechoslovakia was about 90,000 tons per year. In 1982, extraction of copper also continued in the stratiform Bohemian deposits at Zlate Hory and Tisova, as well as in Banska Stiavnica and other deposits in Slovakia. The main copper smelter, the Kropachy copper plant, located about 140 kilometers northeast of Bratislava in Slovakia, produced fire-refined and electrolytic copper. The Poverly copper plant, located near Teplice, produced copper and copper-alloy sheets and strips. The Rokycany copper plant near Pilzen produced copper-alloy sheets, strips, and some wire. The Strakonic copper plant, 60 kilometers southeast of Pilzen in Bohemia, produced copper and copper-alloy wire.

Gallium.—Production of gallium in Czechoslovakia at the Ziar nad Hronom facility was expected to increase to 15% of

the world total. Approximately 90% of output at Ziar was sold abroad. Gallium was a byproduct of treating bauxite.

Gold.—In mid-1982, miners started to drive a gallery at a gold mine in Psi Hory-Celina near Sedlcany to check the results of 3 years of exploration carried out in the region by Geoindustria, Prague. The deposit contained 2 to 3 grams of gold per ton of ore, and estimated ore reserves were 5 million tons, expected to yield to 12.5 tons of gold. Gold mining was to start in 1987. Geoindustria was also exploring around Celina, particularly at Mokrsko where the gold content was slightly lower than at Celina.

Iron and Steel.—Mining of iron ore, mainly siderite, continued at the Rudnany, Nina Slana, and other deposits in Slovakia, but the main steel production was based on imported U.S.S.R. iron ore. The production of steel in 1982 was slightly below the 1981 level. The rate of growth of steel production in Czechoslovakia was to be cut back severely over the next 10 to 15 years, because of fuel shortages, rising only 2.3% per year in 1981 to 1985 and 1.3% in 1986 to 1990. The new coke oven battery at the Trinec iron and steel plant, near Ostrava, went into operation, and a new 200-ton oxygen converter was under construction. At the East Slovak iron and steel complex at Kosice, a 1-million-ton-per-year, U.S.S.R.-built continuous casting machine came onstream, and the converter and coking battery were overhauled.

Renovation and expansion of the new Klement Gottwald steel plant continued. A large coking battery, designed by the U.S.S.R., with a capacity of 1 million tons per year, was put into operation in 1981 and replaced three older batteries. A new 1-million-ton-per-year rolling mill costing Kcs5 billion was under construction in 1982. When completed in 1984, it will replace eight obsolete mills at other enterprises. A general overhaul of the fourth blast furnace was also completed at the plant in November at a cost of more than Kcs500 million. This 80-meter-high, 1,260-cubic-meter furnace was expected to produce 2,000 tons of pig iron per day. The Klement Gottwald plant was the country's biggest industrial enterprise and was producing annually about 3 million tons of coke, almost the same amount of pig iron, 3.7 million tons of steel, and 2.5 million tons of rolled products.

A new billet and logging mill came onstream at the Poldi steelworks in Kladno. The plant was producing annually about 1.8 million tons of special steels and rolled stock. After an 8-month general overhaul and modernization at a cost of Kcs180 million, a 450-millimeter, medium-section rolling mill was put into operation at the Vitkovice iron and steel plant in August 1982.

Lead and Zinc.—The Pribram deposit was exhausted, but mining of lead-zinc ore continued at Horni Benesov in Moravia, Kutna Hara, and Stare Ransko in Bohemia and Banska Stiavnica in Slovakia. Reserves of lead and zinc ore in the recently discovered deposits near Banska Stiavnica were estimated at approximately 50 million tons. In 1982, Czechoslovakia imported zinc mainly from the United Kingdom, Yugoslavia, and the U.S.S.R., and imported lead from the U.S.S.R.

Mercury.—In 1985, extraction of up to 50,000 tons of mercury ore was to begin near Presov, Czechoslovakia. A plant for concentrating the ore was to be built at the site, and the concentrate was to be transported to the processing plants of the Rudne Bane Banska Bystrica National Corp.

Molybdenum.—Deposits of molybdenite (MoS_2) were discovered at the Cista granodiorite massif in West Bohemia. The molybdenite formed a mineralized zone in biotite granite. The deposits reached a thickness of up to 10 meters with an average Mo content of 0.1% to 0.2%. Reserves of molybdenum ore in the operating mine at Hurkz-center amounted to 3 million tons.

Tin and Tungsten.—Cassiterite, SnO_2, and wolframite, (FeMn) WO_4, continued to be supplied from the Horni Slovakov (West Bohemia) and Cinovek (North Bohemia) deposits. New exploration and prospecting for tin and tungsten were proceeding successfully, particularly at the Hnilic-Medvedi Brook deposits in the West Carpathians.

NONMETALS

Fluorite.—Production of fluorite was concentrated in the Ore Mountains (North Bohemia) from several deposits. One flotation plant, at Sobedruhy, near Teplice, was producing fluorite concentrate. The process included separation of pyrite by flotation, followed by a two-stage separation of fluorite from barite, quartz, and other minerals. The fluorite concentrate contained 95% calcium fluoride. In 1982, 25,000 tons of fluorite was imported from Mongolia through the Mongolczechoslovak joint metal enterprise.

Kaolin.—Czechoslovakia was the world's fourth largest producer of kaolin, after the

United States, the United Kingdom, and the U.S.S.R. In 1982, about 350,000 tons of kaolin was exported, mainly to the Federal Republic of Germany, Poland, Austria, and Yugoslavia.

The largest kaolin deposits were located in Western Bohemia in the Karlovy Vary area and near Plzen, Podborang, and Znojmo. Reserves of the highest quality type of kaolin in the Karlovy Vary area were limited; however, deposits of kaolin that were not presently worth exploring, and contained high amounts of iron and titanium, would provide an exceptionally wide basis of raw materials if a proper treatment method was available. Kaolin for the paper industry was processed at Kuznejov.

Salt.—Czechoslovakia consumes about 100,000 tons of table salt per year. Its only domestic deposits were located in Eastern Slovakia, where known deposits of salt were estimated at 1,700 million tons. The mining enterprise at Presov produces 40,000 tons of table salt annually, but plant expansion was to increase salt production in 1984 to 65,000 tons.

MINERAL FUELS

In 1982, total primary energy production from fossil fuels and hydroelectric and nuclear generation in Czechoslovakia was 68 million tons of standard coal equivalent (SCE), including coal, 63 million tons; natural gas, 1 million tons; nuclear energy, 1.9 million tons; and hydroelectric energy, 1.4 million tons. Total primary energy consumption was 103.4 million SCE, and net imports, 35.4 million.

Plans call for nuclear power to account for about two-thirds of generating capacity to be installed by 1990. Installed nuclear generating capacity was to reach 3,520 megawatts, about one-sixth of total capacity, by 1985. This comprises 880 megawatts in block 1 at Jaslovskie Bohunice, in West Slovakia, completed in 1980; 880 megawatts in block 11 at Jaslovskie Bohunice to be completed in 1985; and 1,760 megawatts, in two 880-megawatt blocs, at Dukovany, in Southern Moravia, scheduled for completion in 1985. Construction by 1990 was to include 1,760 megawatts at Mochavce, Central Slovakia, and five 1,000-megawatt units at Mochavce, Malovice, and Temelin.

Coal.—About 85% of Czechoslovak hard-coal reserves were located in Ostrava-Karvina in Northern Moravia, the southernmost part of the Silesian Coalfield. About 75% of the reserves were coking coal. Proven reserves could sustain production at the 1980 level of 24.2 million tons for an estimated 80 years, but only if the industry is able to develop improved technology for mining at depths greater than 1,000 meters. In 1982, the Ostrava Karvina Coalfield accounted for 87% of total hard-coal production. Several exhausted mines were closed and replaced by new ones to maintain production. Coal mining conditions in the basin continued to be very difficult. Production of high-quality coking coal started recently at the Darkov Mine, in the area east of Ostrava-Karvina with projected capacity of 20,000 tons of coal per day. In the future, the center of mining will move to the south, as large reserves of coal have been discovered in the Beskydy Mountains. Bituminous coal deposits were also located at Kladno in Central Bohemia, west of Prague, at Plzen and Rosice. The output at the Kladno mining district accounted for about 8% of the total bituminous coal production. The recently discovered Slany deposits near Kladno were estimated to contain 150 million tons. Development of the Slany Mine, with a shaft diameter of 8.5 meters and a projected depth of 1,300 meters, started in 1982 after 4 years of preparations.

Czechoslovakia was forced to emphasize development of brown coal, mainly for use in power generation, heating, briquets, and manufactured gas. About 70% of brown coal production came from an area roughly 850 square kilometers in extent in North Bohemia, running from Kadan to Usti on Laben; about 20% was mined in the Sokalov district of Western Bohemia.

Production of lignite in the North Bohemia district was about 68 million tons. Priority investments were for development of six major opencast mines and reconstruction of two others, relocation of highways and railroad lines, and supply of excavators, conveyor belts, and machinery for strip mining operations. The principal problem in the lignite area was an increasing amount of overburden. In 1982, the large 6-million-ton-annual-capacity Vrsany surface mine, near Most went into operation and produced 600,000 tons of brown coal; the mine was to supply coal to the Pocerdany electric powerplant.

Gas.—Czechoslovakia was almost completely dependent on gas supplies from the U.S.S.R. Gas imports from the U.S.S.R. amounted to 300 billion cubic feet; the same quantity was to be imported in 1983. Czechoslovakia was expected to receive an

additional 106 to 140 billion cubic feet of gas annually in payment for investment in a new transit pipeline to carry natural gas from the Yamal pipeline to Western Europe. The Czechoslovakia section of the pipeline, linking the Urengoi natural gas deposit in Siberia with Western Europe, will be 860 kilometers long and will run parallel to the existing oil pipeline. It will lead from Velke Kapusany on the U.S.S.R.-Czechoslovak border to Rozvodov on the Czechoslovak-West German border. Because of the pipe's large diameter of 1.42 meters, only three new large compressor stations in Velke, Kapusany, Breslav, and Lveseli nad Lucnici, with total size to 175 megawatts will be needed. The entire pipeline, including the compressor stations, was to be started by 1983 and be in full operation by the end of 1988, carrying 950 billion cubic feet per year. The investment should be returned in 8 years. In 1982, about 3 billion cubic feet of natural gas was extracted in East Slovakia; main gas deposits were in Moravia.

Petroleum.—Crude oil was produced in Czechoslovakia in small quantities, equalling about 0.4% of the country's consumption. Imports of crude oil from the U.S.S.R. reached an estimated 114 million barrels in 1982, and approximately the same amount was scheduled for imports in 1983.

Czechoslovakia was reportedly negotiating for oil deliveries from Iraq, Libya, and Algeria, to be shipped in 1983 through the Adria pipeline; quantities were uncertain but estimated at 30 million barrels. The country's oil deposits and crude oil production were located in the Vienna Basin at the border between Southern Moravia and Western Slovakia. The Moravian state oil enterprise at Hodonin was prospecting for new natural gas and crude oil deposits. In 1982, the enterprise drilled about 120,000 meters, aiming to prepare 406 million cubic feet of natural gas and 19,000 barrels of crude oil for extraction by 1985. Some promising oil deposits were discovered at a depth of 6,500 meters. The new refinery for the processing of U.S.S.R. crude continued under construction at Litvinov in North Bohemia. The new refinery was to process 62,000 tons of oil per day. The first stage of the refinery had been tested in July 1981.

Uranium.—In December 1982, the Government uranium prospecting enterprise completed the boring of 600 meters of prospecting shafts in the Iron Mountains in Bohemia. Uranium mining operations continued at Hamar-na-Jezere. A team of 20 miners at the Hamar No. 1 Mine, east of Ceska Lipa in North Bohemia, working at a depth of 200 meters, produced 10,000 cubic meters of ore in 31 working days.

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[1]Foreign mineral specialist, Division of Foreign Data.
[2]Rude Pravo (Prague). Jan. 29, 1982, pp. 1-3.
[3]Official exchange rate for Czechoslovak korunas (Kcs) to U.S. dollars was Kcs6.09 = US$1.00 in 1982.
[4]Statisticka Rocenka Ceskoslovenske Socialisticke Republiky (Statistical Annual of the Czechoslovakia Socialist Republic) (Prague). 1982, p. 367.
[5]Official exchange rate in 1982 for Soviet rubles to U.S. dollars was rubles 1.00 = US$1.40 approximately.

The Mineral Industry of Denmark and Greenland

By Joseph B. Huvos[1]

DENMARK

In 1982, the Danish economy improved, inflation and interest rates were lower, and the balance-of-payments deficit at current prices was smaller. Denmark's gross national product was about $56 billion,[2] a 13% increase in real terms. Inflation was 10.1%, and unemployment was 9.7%.

Denmark had few known mineral resources of its own and continued to import most fuels and minerals. Mineral production included some oil and gas in the North Sea, and some industrial minerals.

The Government's Raw Materials Act of 1977 continued in force. As a consequence, taxes were levied on exploited or imported raw materials, and also on goods manufactured therefrom. The tax rate in 1982 was $0.042 per cubic meter of material used, but on July 1, 1983, the tax will be raised to $0.06 per cubic meter. In 1981, taxes of $1.2 million were collected on minerals, excluding salt and oil taxes.

Important events in the mineral industry of Denmark in 1982 included doubling of crude oil production in the North Sea, acquisition of a scrap company by Denmark's only steelmaker, disinvestment by Denmark's only fertilizer maker of its foreign ammonia interests, and the resumption of Danish aluminum scrap exports.

Table 1.—Denmark: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
Cement, hydraulic[2] thousand tons	2,627	2,412	1,917	1,602	[e]1,600
Chalk[2]	110,939	123,654	[e]120,000	112,028	[e]100,000
Clays: Kaolin, crude and washed[e]	23,000	20,000	20,000	20,390	30,000
Coke, gashouse	(3)	(3)	(3)	(3)	--
Diatomaceous materials:					
Diatomite	[e]25,000	[e]25,000	[e]25,000	3,465	--
Moler	160,000	125,000	125,000	125,000	125,000
Iron and steel:					
Iron ore (less than 42% Fe), gross weight thousand tons	5	8	8	[e]8	[e]8
Metal content of ore do	2	4	3	3	[e]3
Steel, crude[4] do	863	804	734	612	560
Semimanufactures do	[5]646	[5]683	[5]655	552	455
Lead metal including alloys, secondary	26,200	29,800	24,500	26,500	20,000
Lime, agricultural and quicklime[2] thousand tons	162	177	170	195	[e]195
Nitrogen: N content of ammonia	32,900	32,900	31,200	31,200	30,700
Peat, agricultural[2] thousand tons	47	45	31	33	94

See footnotes at end of table.

Table 1.—Denmark: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
Petroleum and refinery products:					
Crude ____ thousand 42-gallon barrels	3,305	3,313	2,272	5,815	12,929
Refinery products:					
Gasoline ____ do	12,045	12,410	9,367	9,852	8,475
Jet fuel ____ do	32	730	80	48	176
Kerosine ____ do	698		202	101	233
Distillate fuel oil ____ do	24,648	27,740	20,821	19,926	19,389
Residual fuel oil ____ do	16,497	18,980	14,099	11,995	12,334
Other ____ do	3,839	4,380	[r]2,485	2,653	1,897
Refinery fuel and losses ____ do	4,465	4,400	6,517	NA	NA
Total ____ do	62,224	68,640	[r]53,571	44,575	42,504
Salt[2] ____ thousand tons	325	380	[e]380	398	447
Sodium compounds: Sodium carbonate[2]	2,038	2,754	134	149	[e]150
Stone, sand and gravel:[2]					
Dimension stone[6 7] thousand cubic meters	48	NA	NA	60	365
Crushed and broken stone:[7 8]					
Limestone:					
Agricultural ____ do	1,782	2,119	[e]2,100	1,611	2,600
Other ____ do	226	213	[e]200	195	--
Other ____ do	11	NA	NA	NA	NA
Sand:[8]					
Industrial ____ do	1,694	NA	NA	1,875	1,700
Other ____ do	421	881	NA	1,250	1,100
Sulfur, byproduct	14,000	8,000	8,000	6,000	[e]6,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Sept. 6, 1983.

[2]Data represent sales.

[3]Revised to zero.

[4]Includes shipyard's production of steel castings.

[5]Excludes steel forgings.

[6]Granite and gneiss only; excludes an unreported quantity of other dimension stone.

[7]Estimates by the Geological Survey of Denmark for latest year are in this yearbook chapter under "Industrial Minerals."

[8]Partial figures; excludes an unreported quantity of quartz and quartzite.

TRADE

After 1982, North Sea hydrocarbon production was expected to generate a positive change of about $2 billion in Denmark's trade balance. In 1982, the United States was Denmark's major steam coal and coke supplier with about one-third of the total. U.S. mineral imports from Denmark remained insignificant.

Table 2.—Denmark: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	46,483	20,601	15	West Germany 5,882; France 3,479; Sweden 2,860.
Oxides and hydroxides	184	678	62	Sweden 521; West Germany 47; United Kingdom 20.
Metal including alloys:				
Scrap	11,855	12,389	39	West Germany 10,921; Netherlands 498; Belgium-Luxembourg 479.
Unwrought	6,984	7,640	--	Belgium-Luxembourg 2,197; West Germany 2,060; Sweden 1,940.
Semimanufactures	17,938	16,378	75	Sweden 4,894; West Germany 3,314; United Kingdom 2,370.
Beryllium: Metal including alloys, all forms ____ value, thousands	--	$8	--	Yugoslavia $7; Sweden $1.

See footnotes at end of table.

Table 2.—Denmark: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate	--	9	--	All to Sweden.
Oxides and hydroxides	4	16	--	Finland 10; Kuwait 2; Sweden 2.
Cobalt: Oxides and hydroxides value, thousands	$1	$1	--	All to Norway.
Copper:				
Matte and speiss including cement copper	25	--		
Metal including alloys:				
Scrap	15,118	13,105	--	West Germany 11,177; Belgium-Luxembourg 453; France 410.
Unwrought	1,110	1,455	--	Sweden 536; Portugal 381; West Germany 366.
Semimanufactures	8,629	11,733	4,642	United Kingdom 1,272; West Germany 1,183; France 121.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	8,638	8,867	162	West Germany 4,049; United Kingdom 2,147; Netherlands 1,586.
Metal:				
Scrap	100,298	184,847	22	West Germany 149,212; Netherlands 15,597; Norway 6,814.
Pig iron, cast iron, related materials	223	319	--	West Germany 264; United Kingdom 19; Sweden 16.
Ferroalloys, unspecified	6	8	--	France 5; Sweden 3.
Steel, primary forms	4,804	1,024	--	United Kingdom 830; Belgium-Luxembourg 113; West Germany 40.
Semimanufactures:				
Bars, rods, angles, shapes, sections	123,793	115,100	15	West Germany 61,227; Sweden 20,639; United Kingdom 14,749.
Universals, plates, sheets	417,527	359,420	25,496	West Germany 105,228; Sweden 78,600; Norway 35,050.
Hoop and strip	26,672	24,429	--	Sweden 19,156; United Kingdom 2,690; Netherlands 571.
Rails and accessories	1,147	2,227	--	West Germany 2,060; Sweden 128; Greenland 19.
Wire	6,201	4,085	81	Sweden 1,481; United Kingdom 977; Finland 501.
Tubes, pipes, fittings	63,858	74,707	29	Sweden 34,770; West Germany 11,529; United Kingdom 7,863.
Castings and forgings, rough	24,525	23,645	--	Sweden 9,227; West Germany 8,753; Norway 2,554.
Lead:				
Oxides	23	75	--	Bahrain 20; Malta 18; United Arab Emirates 10.
Metal including alloys:				
Scrap	1,702	1,874	--	West Germany 1,864; Cyprus 6.
Unwrought	14,736	14,708	522	Norway 3,981; Austria 3,783; Finland 1,274.
Semimanufactures	139	85	--	Iraq 34; West Germany 16; Norway 10.
Magnesium: Metal including alloys:				
Scrap	205	142	--	West Germany 131; Portugal 11.
Unwrought	--	4	--	All to Sweden.
Semimanufactures	7	13	--	Sweden 11; Peru 1; Portugal 1.
Manganese: Oxides	399	399	--	Iraq 200; Sweden 148; West Germany 23.
Mercury 76-pound flasks	116	203	--	United Kingdom 174; West Germany 29.
Metalloids: Unspecified	2	6	3	Colombia 1; Sweden 1.
Molybdenum: Metal including alloys, all forms	4	14	--	Italy 9; West Germany 3; France 2.
Nickel: Metal including alloys:				
Scrap	95	32	--	West Germany 11; Sweden 10; India 9.
Semimanufactures	15	25	--	Norway 6; Sweden 6; Israel 5.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$1,540	$2,184	--	Sweden $1,762; United Kingdom $242; Finland $63.
Silver:				
Waste and sweepings[2] do	$19,135	$10,560	--	France $3,311; West Germany $2,447; Switzerland $2,231.
Metal including alloys, unwrought and partly wrought do	$23,050	$6,239	$2	France $2,354; Sweden $1,622; Norway $493.

See footnotes at end of table.

Table 2.—Denmark: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	24	--		
Metal including alloys:				
Scrap	244	(3)	--	All to West Germany.
Unwrought	484	410	--	Netherlands 138; Norway 110; United Kingdom 45.
Semimanufactures	23	134	(3)	Norway 52; Austria 34; Iraq 34.
Titanium: Oxides	746	574	--	Sweden 345; United Kingdom 100; West Germany 81.
Tungsten: Metal including alloys, all forms	6	17	--	West Germany 10; Sweden 6.
Zinc:				
Ore and concentrate	301	615	--	Norway 398; Sweden 118.
Oxides	7	39	--	Malta 15; United Kingdom 13; Qatar 3.
Metal including alloys:				
Scrap	3,387	3,772	--	West Germany 2,590; East Germany 830; Norway 174.
Unwrought	926	165	--	West Germany 39; Greece 37; Bahrain 26.
Semimanufactures	289	326	--	West Germany 235; Saudi Arabia 26; Norway 21.
Other:				
Ores and concentrates	442	521	--	Norway 398; Sweden 109.
Oxides and hydroxides	62	39	--	Japan 14; Iceland 9; United Kingdom 7.
Ashes and residues	5,607	6,675	--	West Germany 2,289; United Kingdom 2,182; Norway 1,727.
Base metals including alloys, all forms	82	7	(3)	Colombia 2; West Germany 2; Norway 1.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	10	14	--	West Germany 8; France 3.
Artificial: Corundum	--	2	--	Italy 1.
Grinding and polishing wheels and stones	1,310	1,548	1	Ethiopia 521; Iran 360; Egypt 154.
Asbestos, crude	48	12	--	West Germany 11; Japan 1.
Barite and witherite	15	36	--	Iceland 12; West Germany 10; Bahrain 9.
Boron materials:				
Crude natural borates	5	5	--	Iceland 4.
Oxides and acids	42	261	--	Sweden 226; Norway 35.
Cement	279,055	374,187	52,166	Venezuela 136,299; Sweden 47,045; Israel 38,620.
Chalk	15,300	21,903	--	Sweden 8,245; Norway 4,624; West Germany 189.
Clays and clay products:				
Crude, unspecified	1,845	2,261	6	Sweden 751; Iran 500; Norway 345.
Products:				
Nonrefractory	88,591	94,481	533	West Germany 73,682; Sweden 10,018; Norway 5,687.
Refractory including nonclay brick	35,500	31,796	434	West Germany 5,015; United Kingdom 4,512; Norway 3,015.
Cryolite and chiolite	22,678	18,321	NA	NA.
Diamond:				
Gem, not set or strung value, thousands	$69	$306	--	Belgium-Luxembourg $171; Switzerland $91; Sweden $20.
Industrial do	$9	$10	--	Switzerland $6; Belgium-Luxembourg $4.
Diatomite and other infusorial earth	56,270	60,027	10	West Germany 22,583; Netherlands 11,789; Switzerland 8,487.
Feldspar, fluorspar, related materials:				
Unspecified	2	2	NA	NA.
Fertilizer materials:				
Crude, n.e.s	324	93	--	All to Sweden.
Manufactured:				
Ammonia	464	439	--	Sweden 362; West Germany 23; Greenland 19.
Nitrogenous	641	68	--	West Germany 29; Iceland 11; Greenland 10.
Phosphatic	105,117	91,192	--	Sweden 214; unspecified 90,937.
Potassic	7	5,004	--	Finland 5,003.
Unspecified and mixed	136,673	189,412	--	Ireland 2,667; Sweden 771; unspecified 185,486.

See footnotes at end of table.

Table 2.—Denmark: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Graphite, natural	7	17	--	West Germany 14; Saudi Arabia 2.
Gypsum and plaster	168	956	--	Libya 681; West Germany 130; Sweden 96.
Halogens:				
Chlorine	100	100	--	Iceland 93; West Germany 3.
Unspecified	3	4	--	Ghana 2.
Lime	8,426	6,688	(3)	Norway 3,017; Greenland 1,481; Finland 978.
Magnesium compounds: Magnesite	78	78	--	Indonesia 72; Saudi Arabia 2; Sweden 2.
Mica:				
Crude including splittings and waste	29	12	--	Switzerland 6; Japan 4; Finland 2.
Worked including agglomerated splittings	1	1	--	Mainly to Sweden.
Phosphates, crude	--	2	--	All to Sweden.
Pigments, mineral: Iron oxides and hydroxides, processed	125	226	5	Sweden 57; Finland 45; West Germany 38.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$89	$387	$1	United Kingdom $224; Norway $51; Sweden $27.
Synthetic do.	$5	$11	--	Sweden $7; West Germany $1; Norway $1.
Salt and brine	45,904	121,021	121	Sweden 61,518; Finland 26,737; Norway 19,473.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	8	23	--	Saudi Arabia 7; Iceland 3; undetermined 10.
Sodium carbonate, natural and manufactured	171	--		
Sodium hydroxide	2,417	14,916	--	Sweden 5,398; West Germany 4,513; Netherlands 2,107.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	67,959	38,691	--	West Germany 38,493; Sweden 97; Norway 50.
Worked	7,641	8,564	1	West Germany 7,819; Netherlands 185; Sweden 175.
Dolomite, chiefly refractory-grade	262	167	--	Iceland 65; United Kingdom 55; Saudi Arabia 20.
Gravel and crushed rock thousand tons	1,184	1,013	--	West Germany 991; Sweden 13.
Limestone other than dimension	73,925	113,012	--	West Germany 65,278; Sweden 33,065; Norway 9,677.
Quartz and quartzite	226	93	--	Sweden 43; West Germany 24.
Sand other than metal-bearing	162,780	129,713	--	Sweden 100,184; West Germany 10,439; Finland 9,575.
Sulfur:				
Elemental:				
Crude including native and by-product	51	212	--	Sweden 170; West Germany 41.
Colloidal, precipitated, sublimed	--	24	--	All to Sweden.
Sulfuric acid	16,245	360	--	Norway 166; Sweden 96; Iceland 34.
Talc, steatite, soapstone, pyrophyllite	68	163	--	West Germany 80; Saudi Arabia 24; Yugoslavia 17.
Other:				
Crude	1,236	1,359	--	West Germany 1,221; Greenland 65; Norway 37.
Slag and dross, not metal-bearing	31,831	31,084	--	France 10,900; Norway 9,458; West Germany 7,252.
Oxides and hydroxides of barium, magnesium, strontium	3	6	--	Switzerland 5; Iceland 1.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	8,804	17,713	--	United Kingdom 5,054; Sweden 3,092; Norway 2,604.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,073	190	--	West Germany 76; Sweden 66.
Carbon: Carbon black	33	241	--	Greenland 132; Norway 26; West Germany 24.
Coal:				
Anthracite and bituminous	4,103	3,116	--	Greenland 2,150; Netherlands 931.
Briquets of anthracite and bituminous coal	1	2	--	All to Iceland.
Lignite including briquets	27	--		

See footnotes at end of table.

Table 2.—Denmark: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	56,980	40,565	--	Sweden 24,868; Norway 12,907; West Germany 2,057.
Peat including briquets and litter	2,654	1,876	--	Norway 857; United Kingdom 239; Netherlands 225.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	141	85	(3)	Sweden 84.
Gasoline do	3,520	3,784	--	Sweden 3,077; United Kingdom 338; Netherlands 139.
Mineral jelly and wax 42-gallon barrels	5,241	5,163	--	Sweden 3,534; United Kingdom 442; Finland 307.
Kerosine and jet fuel do	14,337	3,836	5	Norway 85; Saudi Arabia 54; Portugal 47.
Distillate fuel oil thousand 42-gallon barrels	6,645	4,637	5	Sweden 3,296; West Germany 449; Netherlands 329.
Lubricants do	208	145	(3)	Norway 95; Sweden 13; Greenland 10.
Residual fuel oil do	1,194	496	19	United Kingdom 222; Iceland 127; Norway 64.
Bitumen and other residues do	444	621	--	Sweden 299; Norway 169; Finland 137.
Bituminous mixtures 42-gallon barrels	13,653	10,738	--	Sweden 2,854; West Germany 2,648; Greenland 1,679.
Petroleum coke do	2,728	--		
Tars and other crude chemicals derived from coal, gas, and petroleum	22,306	24,973	--	Norway 10,691; West Germany 6,444; Sweden 4,474.

NA Not available.
[1]Includes Faroe Island.
[2]May include other precious metals.
[3]Less than 1/2 unit.

Table 3.—Denmark: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	263	316	1	West Germany 310; France 5.
Aluminum:				
Ore and concentrate	90,554	68,507	29	Suriname 40,432; China 20,249; India 4,945.
Oxides and hydroxides	4,018	5,057	1,047	United Kingdom 1,999; West Germany 1,806; Jamaica 62.
Metal including alloys:				
Scrap	2,269	2,623	--	West Germany 1,534; Sweden 706; Norway 361.
Unwrought	21,935	18,566	--	Norway 10,127; West Germany 2,546; United Kingdom 2,366.
Semimanufactures	59,030	53,533	399	West Germany 12,742; Norway 8,171; Sweden 6,248.
Beryllium: Metal including alloys, all forms	1	1	(2)	Mainly from West Germany.
Chromium:				
Ore and concentrate	200	346	100	West Germany 221; Finland 25.
Oxides and hydroxides	370	353	1	West Germany 312; Italy 38.
Cobalt: Oxides and hydroxides	5	6	--	United Kingdom 4; Canada 2.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$18	$31	$6	United Kingdom $12; Austria $7; Switzerland $4.

See footnotes at end of table.

Table 3.—Denmark: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Copper:				
Matte and speiss including cement copper	--	8	--	All from Belgium-Luxembourg.
Metal including alloys:				
Scrap	3,124	5,280	129	United Kingdom 1,517; West Germany 1,340; France 966.
Unwrought	3,686	2,183	8	Belgium-Luxembourg 1,252; Sweden 317; Yugoslavia 197.
Semimanufactures	35,211	26,895	83	West Germany 8,368; Sweden 6,233; Belgium-Luxembourg 4,941.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	3,345	127,226	--	Sweden 127,222.
Pyrite, roasted	16,288	18,928	--	Norway 18,884; West Germany 23.
Metal:				
Scrap	216,796	180,077	--	United Kingdom 103,583; West Germany 36,292; U.S.S.R. 21,166.
Pig iron, cast iron, related materials	43,607	51,467	24	West Germany 21,831; Sweden 15,863; Spain 4,727.
Ferroalloys:				
Ferromanganese	6,258	3,698	--	Norway 3,672; West Germany 25.
Unspecified	11,302	6,998	17	Norway 4,923; United Kingdom 606; Sweden 454.
Steel, primary forms	114,113	123,990	--	Finland 29,692; Norway 28,986; West Germany 26,270.
Semimanufactures:				
Bars, rods, angles, shapes, sections	306,414	285,009	422	West Germany 97,059; Sweden 54,639; Belgium-Luxembourg 29,781.
Universals, plates, sheets	716,756	655,980	64	West Germany 250,028; Sweden 66,091; Finland 58,738.
Hoop and strip	56,868	49,455	16	West Germany 29,743; Sweden 7,949; Finland 3,820.
Rails and accessories	12,952	17,283	--	West Germany 8,523; France 5,238; Austria 2,839.
Wire	30,792	29,090	25	Belgium-Luxembourg 11,924; West Germany 9,336; Sweden 5,127.
Tubes, pipes, fittings	183,664	291,220	82	West Germany 134,958; France 60,211; United Kingdom 26,411.
Casting and forgings, rough	6,459	4,482	--	West Germany 2,028; Norway 1,025; Sweden 350.
Lead:				
Oxides	547	647	27	West Germany 309; East Germany 160; France 93.
Metal including alloys:				
Scrap	16,546	18,161	515	Norway 4,613; United Kingdom 3,690; West Germany 3,011.
Unwrought	6,523	3,572	(2)	West Germany 1,365; Sweden 809; Finland 377.
Semimanufactures	3,956	3,482	(2)	West Germany 3,367; France 52; United Kingdom 34.
Magnesium: Metal including alloys:				
Scrap	--	24	--	All from Sweden.
Unwrought	113	34	--	Norway 32; West Germany 1.
Semimanufactures	87	61	26	West Germany 16; Switzerland 10; United Kingdom 4.
Manganese:				
Ore and concentrate, metallurgical-grade	819	611	--	Netherlands 296; West Germany 164; Gabon 150.
Oxides	2,086	1,616	8	Belgium-Luxembourg 1,215; Greece 140; China 114.
Mercury 76-pound flasks	290	261	29	Netherlands 58; Sweden 58; U.S.S.R. 29.
Metalloids: Unspecified	853	792	(2)	Norway 465; France 195; West Germany 64.
Molybdenum: Metal including alloys, all forms	6	5	(2)	France 2; West Germany 2; Austria 1.
Nickel:				
Matte and speiss	21	5	--	All from United Kingdom.
Metal including alloys:				
Scrap	4	15	--	Norway 14.
Unwrought	179	116	--	Finland 47; United Kingdom 34; Sweden 18.
Semimanufactures	213	137	6	West Germany 76; United Kingdom 19; Finland 14.

See footnotes at end of table.

Table 3.—Denmark: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified ____ value, thousands__	$6,833	$6,938	$83	Netherlands $2,937; West Germany $1,840; Switzerland $1,387.
Silver:				
Waste and sweepings[3] _____do____	$1,521	$573	$1	Sweden $451; Finland $90; Netherlands $22.
Metal including alloys, unwrought and partly wrought _____do____	$35,744	$12,814	$23	United Kingdom $4,394; West Germany $2,879; Netherlands $1,947.
Tin: Metal including alloys:				
Scrap _____	249	143	__	West Germany 49; Singapore 36; Norway 18.
Unwrought _____	246	110	__	China 20; Thailand 20; Malaysia 15.
Semimanufactures _____	74	42	__	West Germany 20; United Kingdom 12; Netherlands 6.
Titanium: Oxides _____	5,821	6,134	29	Norway 2,211; United Kingdom 1,650; Italy 1,159.
Tungsten: Metal including alloys, all forms _____	15	5	(2)	Sweden 2; Austria 1; West Germany 1.
Uranium and/or thorium:				
Ore and concentrate value, thousands__	$85	$11	__	All from Netherlands.
Metal including alloys, all forms do____	$12	$8	__	West Germany $6; United Kingdom $2.
Zinc:				
Ore and concentrate _____	__	5	__	All from Sweden.
Oxides _____	2,802	2,334	(2)	West Germany 1,596; Norway 294; United Kingdom 149.
Metal including alloys:				
Scrap _____	101	128	__	Sweden 117; United Kingdom 11.
Unwrought _____	17,024	14,246	4	Norway 5,813; Finland 5,287; Netherlands 1,981.
Semimanufactures _____	4,949	4,913	3	France 2,527; Norway 942; West Germany 893.
Other:				
Ores and concentrates _____	147	675	__	Finland 575; Norway 66; Sweden 30.
Oxides and hydroxides _____	691	944	(2)	West Germany 522; Belgium-Luxembourg 175; United Kingdom 71.
Ashes and residues _____	7,471	7,755	676	United Kingdom 4,014; West Germany 1,373; Norway 451.
Base metals including alloys, all forms	69	64	8	Sweden 16; Belgium-Luxembourg 11; West Germany 9.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc _____	40,061	22,005	14	Iceland 21,231; Netherlands 463; West Germany 206.
Artificial, corundum _____	477	561	__	West Germany 402; Netherlands 137; Spain 20.
Dust and powder of precious and semiprecious stones, including diamond value, thousands__	$238	$231	$62	Switzerland $158; West Germany $5.
Grinding and polishing wheels and stones _____	1,124	1,012	8	West Germany 360; Austria 272; Sweden 160.
Asbestos, crude _____	13,713	5,136	__	Canada 5,022; West Germany 85; Belgium-Luxembourg 25.
Barite and witherite _____	12,461	16,951	__	Netherlands 14,902; United Kingdom 1,238.
Boron materials:				
Crude natural borates _____	5,414	5,154	4,519	Belgium-Luxembourg 390; West Germany 145.
Oxides and acids _____	350	388	104	France 178; Italy 88; West Germany 12.
Cement _____	6,812	32,572	1	West Germany 17,432; Poland 13,157; France 617.
Chalk _____	9,967	15,073	2	West Germany 11,157; France 2,539; Sweden 919.
Clays and clay products:				
Crude, unspecified _____	50,796	47,568	829	United Kingdom 33,294; West Germany 9,387; Netherlands 1,603.
Products:				
Nonrefractory _____	61,668	40,302	__	West Germany 17,772; Italy 10,172; Spain 3,445.
Refractory including nonclay brick _____	29,718	20,194	140	West Germany 12,083; Austria 3,414; United Kingdom 1,658.

See footnotes at end of table.

Table 3.—Denmark: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Cryolite and chiolite	48,535	46,458	2	Greenland 46,455.
Diamond:				
Gem, not set or strung value, thousands	$4,392	$2,964	--	Belgium-Luxembourg $1,427; Switzerland $490; United Kingdom $335.
Industrial do	$203	$29	--	Switzerland $14; Belgium-Luxembourg $5; Israel $4.
Diatomite and other infusorial earth	7,205	6,236	2,063	Iceland 2,420; Spain 820; France 538.
Feldspar, fluorspar, related materials:				
Unspecified	16,899	12,037	--	Norway 10,293; Sweden 1,051; West Germany 346.
Fertilizer materials:				
Crude, n.e.s	21	8	--	West Germany 7; Netherlands 1.
Manufactured:				
Ammonia	309,076	328,162	4,979	West Germany 187,256; U.S.S.R. 39,992; Norway 39,937.
Nitrogenous	93,592	85,108	2,351	Norway 58,304; West Germany 14,512; Netherlands 4,184.
Phosphatic	5,226	11,358	--	West Germany 5,221; Tunisia 3,925; Republic of South Africa 1,636.
Potassic	235,417	245,206	46,943	West Germany 105,382; East Germany 77,448; U.S.S.R. 11,237.
Unspecified and mixed	537,032	440,687	32,840	Norway 304,094; West Germany 74,449; Belgium-Luxembourg 23,746.
Graphite, natural	990	853	36	West Germany 705; United Kingdom 46; China 40.
Gypsum and plaster	307,994	225,014	--	Spain 208,506; France 8,802; West Germany 4,798.
Halogens:				
Chlorine	910	1,242	1	Norway 1,173; West Germany 63.
Unspecified	101	91	--	Israel 70; United Kingdom 18.
Lime	5,630	7,648	--	West Germany 6,012; Poland 1,166; Norway 249.
Magnesium compounds: Magnesite	13,872	11,130	160	Austria 5,626; Spain 3,049; China 978.
Mica:				
Crude including splittings and waste	175	173	--	Norway 84; United Kingdom 76; West Germany 10.
Worked including agglomerated splittings	65	43	--	Belgium-Luxembourg 31; United Kingdom 6; France 3.
Nitrates, crude	1,501	2,939	--	Chile 2,938.
Phosphates, crude	312,163	338,152	68,394	Morocco 237,339; U.S.S.R. 23,384; Sweden 8,903.
Pigments, mineral: Iron oxides and hydroxides, processed	4,038	4,457	2	West Germany 3,485; Spain 598; France 173.
Potassium salts, crude	849	875	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$2,065	$689	$11	West Germany $421; Canada $50; Switzerland $41.
Synthetic do	$130	$47	$8	Switzerland $23; France $10; West Germany $3.
Pyrite, unroasted	19	581	--	All from Sweden.
Salt and brine	282,965	242,499	42	West Germany 104,846; U.S.S.R. 56,551; Spain 43,615.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	3,494	3,489	--	Belgium-Luxembourg 1,226; France 1,036; West Germany 610.
Sodium carbonate, natural and manufactured	67,951	71,898	1	East Germany 27,483; Netherlands 14,426; United Kingdom 9,805.
Sodium hydroxide	84,416	97,726	--	Norway 50,121; West Germany 36,321; Netherlands 7,256.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	183,272	103,625	--	Sweden 94,639; West Germany 4,841; Norway 2,201.
Worked	41,690	27,053	--	Sweden 8,637; Portugal 8,414; West Germany 4,081.
Dolomite, chiefly refractory-grade	30,933	30,567	--	Norway 16,568; Sweden 8,987; West Germany 4,371.
Gravel and crushed rock	812,508	718,621	20	Sweden 638,268; Norway 74,141.
Limestone other than dimension	189,769	160,510	--	Sweden 89,280; United Kingdom 69,065; Norway 1,264.

Table 3.—Denmark: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Quartz and quartzite	12,967	16,778	2	Sweden 15,613; Norway 770; West Germany 266.
Sand other than metal-bearing	141,042	161,755	311	Belgium-Luxembourg 115,271; Sweden 29,821; West Germany 9,839.
Sulfur:				
Elemental:				
Crude including native and by-product	79,706	73,069	--	West Germany 72,810; Poland 180.
Colloidal, precipitated, sublimed	114	119	--	West Germany 109; United Kingdom 10.
Sulfuric acid	7,634	14,214	--	Sweden 8,869; West Germany 5,280; Norway 38.
Talc, steatite, soapstone, pyrophyllite	8,001	8,963	--	Norway 4,854; Finland 2,444; Austria 754.
Other:				
Crude	43,975	49,479	236	East Germany 35,490; West Germany 5,071; Norway 2,458.
Slag and dross, not metal-bearing	3,018	7,179	--	West Germany 2,808; United Kingdom 2,474; Norway 1,802.
Oxides and hydroxides of barium, magnesium, strontium	1,024	950	4	Sweden 326; United Kingdom 237; West Germany 164.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	8,011	10,927	7	West Germany 4,526; Finland 1,731; Belgium-Luxembourg 1,633.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	6,327	15,023	171	Sweden 7,588; West Germany 5,848; Netherlands 1,360.
Carbon: Carbon black	4,444	3,995	162	West Germany 1,687; Sweden 1,130; United Kingdom 411.
Coal:				
Anthracite and bituminous thousand tons	10,005	10,886	51	Poland 73; United Kingdom 36; unspecified 10,716.
Briquets of anthracite and bituminous coal	75,228	5,511	--	Poland 2,719; Belgium-Luxembourg 2,589; West Germany 117.
Lignite including briquets	40,001	55,474	--	East Germany 30,356; West Germany 25,024.
Coke and semicoke	114,011	78,859	18	France 31,063; West Germany 18,366; United Kingdom 15,728.
Peat including briquets and litter	23,277	21,846	--	Sweden 14,402; Finland 4,895; U.S.S.R. 2,042.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	42,069	52,441	--	United Kingdom 17,836; Netherlands 16,702; Saudi Arabia 7,963.
Refinery products:				
Liquefied petroleum gas do	1,666	1,727	(2)	United Kingdom 801; West Germany 379; Norway 242.
Gasoline do	6,926	7,061	(2)	Sweden 2,092; Netherlands 1,818; Belgium-Luxembourg 947.
Mineral jelly and wax do	106	104	2	West Germany 73; Hungary 8; United Kingdom 8.
Kerosine and jet fuel do	6,205	5,748	(2)	Netherlands 3,512; Belgium-Luxembourg 861; France 571.
Distillate fuel oil do	26,869	19,987	31	United Kingdom 4,477; Sweden 4,145; Netherlands 4,107.
Lubricants do	5,033	2,370	8	East Germany 741; U.S.S.R. 635; West Germany 245.
Residual fuel oil do	17,099	12,416	321	Sweden 5,455; East Germany 1,643; Netherlands 1,399.
Bitumen and other residues do	1,267	987	(2)	Netherlands 403; West Germany 334; Sweden 230.
Bituminous mixtures do	13	17	1	West Germany 11; Sweden 2; United Kingdom 1.
Petroleum coke do	370	444	376	Monserrat 67.
Tars and other crude chemicals derived from coal, gas, and petroleum	53,715	45,888	1,389	Sweden 14,944; Norway 11,869; West Germany 11,195.

[1]Includes Faroe Island.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

Metals.—*Aluminum.*—Exports of aluminum scrap and waste from Denmark to non-European Economic Community countries were again permitted by the Government. In the meantime, exports were halted in November and December because scrap shortages had forced the Danish aluminum scrap processing industry to operate at only about 60% of capacity. There is no primary aluminum industry in Denmark.

Iron and Steel.—Det Danske Stalvalservaerk A/S (DDS), Denmark's only major steelmaker, operated at a moderate profit. In 1981, the Government had taken a 30% equity share in the company, which had previously been entirely privately owned. Most of the plant's equipment was new, including two 200-ton electric arc furnaces supplied by Mannesmann Demag AG. In addition, oxygen-fuel burners were installed to increase the furnace's capacity, and new water-cooled panels made it possible to supply the local community of Frederiksvaerk with hot water for district heating.

To improve DDS's scrap supply, DDS acquired a one-third stake in Uniscrap A/S, Denmark's biggest scrap concern. Uniscrap had been formed years earlier from Levin Jern Metal A/S and Peterson & Albeck A/S.

Nonmetals.—*Ammonia.*—Superfos A/S pulled out of its Brunsbüttel, Federal Republic of Germany, ammonia plant by taking a $43 million writeoff against its 1982 accounts, after the plant had accumulated a $69 million loss since 1978. As part of the disinvestment deal, Superfos has agreed to buy ammonia from the Brunsbüttel plant for 5 years.

Industrial Minerals.—According to the Geological Survey of Denmark, a number of industrial minerals were produced again in 1982, including sand, gravel, pebbles, and stone estimated at 22.7 million cubic meters. There were 939 gravel pits on land with a production of about 19.9 million cubic meters, and 2.7 million cubic meters were produced from offshore. Production of chalk and limestone was estimated at 2.7 million cubic meters; clay, 0.8 million cubic meters; rockwool and expanded clay, about 300,000 cubic meters; and peat, 376,000 cubic meters. Production of granite, sandstone, and slate was about 365,000 cubic meters.

Mineral Fuels.—In 1982, Denmark was 90% dependent on imported fuels, increasingly consisting of coal and coke because of oil-to-coal conversion, while the use of oil continued to decrease. It was expected that North Sea hydrocarbon production will generate a positive change in the trade balance of up to $2 billion before 1986.

Table 4.—Denmark and Greenland: Supply and apparent consumption of fuels and power

(Million tons of standard coal equivalent)

	Coal and coke	Petroleum and refinery products	Hydroelectric power[1]	Total energy
1981:				
Production[2]	—	1.2	(3)	1.2
Imports	9.8	16.7	1.0	27.5
Exports	—	1.8	.3	2.1
Apparent consumption	9.8	16.1	.7	26.6
1982:[p]				
Production[2]	—	2.7	(3)	2.7
Imports	11.0	16.6	.5	28.1
Exports	—	1.6	.3	1.9
Apparent consumption	11.0	17.7	.2	28.9

[p]Preliminary.
[1]Includes all foreign trade of electricity.
[2]Primary energy only.
[3]Less than 1/2 unit.

Source: Denmarks Statistik, Monthly Bulletin of Statistics. December 1982, p. 62.

In 1982, crude oil production on the Danish Continental Shelf almost doubled at the two commercial oilfields, Dan and Gorm, of the Dansk Undergrunds Consortium (DUC).

Actual oil production at Dan decreased to 5,400 barrels per day in 1982 from 5,900 barrels per day in 1981. Gorm production increased during the same period from 9,000 barrels per day to 28,200 barrels per day. This included oil from Skjøld, which

came onstream in November 1982. Skjøld used Gorm production facilities and its output may reach 3,000 barrels per day in 1983.

There was a significant increase in exploratory drilling offshore as five exploratory wells were drilled in 1982 compared with one in 1981, because of the enlargement of DUC's drilling rig fleet to five. Three exploration rigs obtained disappointing results in the Jens-1 and Mona-1 wells. The remaining two rigs drilled production wells in the Tyra Gasfield, which was scheduled to start up gas deliveries from 36 wells in October 1983. Dansk Olie og Naturgas A/S's gas pipeline has already been laid for this purpose, as has an oil pipeline from Gorm.

GREENLAND

PRODUCTION AND TRADE

In 1982, some lead and zinc concentrates and cryolite were the only mineral products of Greenland, the world's largest island, located in the Arctic Ocean.

Greenland was still debating how to leave the European Economic Community (EEC), but the EEC continued to award funds for a number of Greenland projects. Projects funded included study of phosphates in two major carbonatite deposits on the west coast, a joint project by the Institute of Geological Sciences and the Warren Springs Laboratories, both from the United Kingdom, and exploration of a new columbium-tantalum deposit in southern Greenland by the Technische Universität in Berlin. Both projects are to be in cooperation with the Geological Survey of Greenland. Further EEC funds were earmarked for the Nordisk Mineselskab A/S drilling projects for delineating vein-type tungsten and antimony mineralization in Central East Greenland.

Table 5.—Greenland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
Lead, mine output, metal content:					
Of ore hoisted	36,018	35,255	34,344	30,000	31,725
Of concentrates	30,600	31,900	30,100	27,400	28,000
Silver, mine output, metal content:					
Of ore hoisted thousand troy ounces	699	763	771	720	760
Of concentrates do	559	543	547	543	[e]550
Zinc, mine output, metal content:					
Of ore hoisted	90,050	92,950	86,832	83,400	85,050
Of concentrates	[r]82,200	[r]86,600	[r]85,700	79,700	77,000

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Oct. 5, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (common clays, sand and gravel, and stone) are undoubtedly produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

Table 6.—Greenland: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Principal destinations, 1981
Aluminum: Metal including alloys, scrap	2	--	
Copper: Metal including alloys, scrap	49	60	All to Denmark.
Cryolite and chiolite	48,530	46,455	Do.
Iron and steel: Metal:			
Scrap	736	5	Do.
Steel, primary forms	--	2	Do.
Semimanufactures:			
Bars, rods, angles, shapes, sections	--	9	Do.
Tubes, pipes, fittings	--	1	Do.
Unspecified value, thousands	$3	--	
Lead:			
Ore and concentrate	37,729	24,499	France 16,015; West Germany 8,484.
Metal including alloys, scrap	--	2	All to Denmark.
Petroleum refinery products: Unspecified value, thousands	--	$1	Do.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	25	--	
Worked	4	3	All to Denmark.
Gravel and crushed rock	--	5	NA.
Zinc: Ore and concentrate	156,325	107,689	Finland 47,780; France 39,359; West Germany 20,550.

NA Not available.

COMMODITY REVIEW

Metals.—*Lead and Zinc.*—Greenex A/S discovered a moderately large high-grade sulfide ore body near the Black Angel Mine in Marmorilik. The company plans to mine the deposit for the next 6 years in summer only.

Tungsten.—Nordisk Mineselskab A/S has finished an EEC supported 3-year field exploration project on tungsten and antimony mineralized veins in the Proterozoic of Eastern Greenland and found promising occurrences. Drilling is to follow.

Nonmetals.—*Cryolite.*— Kriolitselskabet Øresund A/S has announced that the cryolite pit at Ivigtut, southeast Greenland, is to be reopened to quarry the remaining low-grade crude ore, which was considered uneconomic when the pit was closed in 1962. This extends availability of raw materials for the refining plant in Copenhagen.

Graphite.—Kryolitselskabet Øresund A/S has decided to explore the long-known crystalline graphite deposit south of Egedesminde-Aasiaat on the Akuliaruseq Peninsula. The deposit is close to waters that are open year-round. Its development was abandoned after World War I.

Mineral Fuels.—*Coal.*—The Raw Materials Administration of the Ministry for Greenland has commissioned a prefeasibility study for mining coal in Greenland for domestic use only on a scale of 150,000 tons per year. So far negotiations between the Greenland-Danish official representatives and Arco Greenland concerning an exploration permit for Jameson Land just north of Scoresundby-Illoqqortookmiut have not led to a commitment from the oil company to carry out seismic survey and drilling. Besides climatic difficulties, environmental regulations reduce the profitability of any project in the area.

Uranium.—The Danish Energy Ministry financially supported the south Greenland uranium exploration program of the Geological Survey of Greenland. Fieldwork was centered around the Igaliko batholith, a complex alkaline intrusion of late Archean age. A columbium-rich microsyenite has attracted special attention.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Danish kroner (DKr) to U.S. dollars at the rate of DKr8.33=US$1.00 for 1982.

Table 7.—Greenland: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought ___ value, thousands__	$1	$1	__	All from Denmark.
Semimanufactures_____	85	51	1	Denmark 48; Sweden 2.
Copper: Metal including alloys, semi-manufactures _____	123	90	__	Denmark 89.
Iron and steel: Metal:				
Scrap_____	__	1	__	All from Denmark.
Pig iron, cast iron, related materials _	__	5	__	Do.
Steel, primary forms_____	2	4	__	Do.
Semimanufactures:				
Bars, rods, angles, shapes, sections	2,398	2,498	1	Denmark 2,402; Sweden 17; United Kingdom 12.
Universals, plates, sheets _____	467	595	1	Denmark 542; Norway 41; Sweden 8.
Hoop and strip_____	36	7	__	All from Denmark.
Rails and accessories _____	46	161	__	Canada 142; Denmark 19.
Wire_____	19	19	__	All from Denmark.
Tubes, pipes, fittings _____	1,073	974	(1)	Denmark 914; Sweden 55.
Castings and forgings, rough ___	566	655	__	Bulgaria 621; Denmark 34.
Lead: Metal including alloys:				
Scrap_____	4	4	__	All from Denmark.
Unwrought _____	1	1	__	Do.
Semimanufactures_____	5	7	__	Do.
Nickel: Metal including alloys, semi-manufactures __ value, thousands__	__	$1	__	Do.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified _____do____	__	$2	__	Do.
Silver: Metal including alloys, unwrought and partly wrought _____do____	$81	$8	__	Do.
Tin: Metal including alloys:				
Unwrought _____do____	$1	__		
Semimanufactures_____do____	$2	$7	__	All from Denmark.
Zinc: Metal including alloys:				
Unwrought _____do____	$1	$1	__	All from Norway.
Semimanufactures_____	17	19	__	All from Denmark.
Other: Base metals including alloys, all forms _____	4	__		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc _____ value, thousands__	$1	__		
Grinding and polishing wheels and stones _____	2	2	__	All from Denmark.
Cement_____	8,794	9,532	__	Do.
Clays and clay products:				
Crude, unspecified _____	23	22	__	Do.
Products:				
Nonrefractory_____	474	347	4	Do.
Refractory including nonclay brick _____	7	8	__	Do.
Diamond: Gem, not set or strung value, thousands__	__	$3	__	Do.
Diatomite and other infusorial earth ___	2	2	__	Do.
Fertilizer materials: Manufactured:				
Ammonia _____	15	19	__	Do.
Nitrogenous_____	711	611	__	Canada 601; Denmark 10.
Unspecified and mixed _____	145	157	__	All from Denmark.
Halogens, unspecified _____	__	(1)	__	Do.
Lime _____	576	1,481	__	Do.
Precious and semiprecious stones other than diamond: Natural value, thousands__	$5	$2	__	Denmark $1.
Salt and brine_____	8,061	5,208	__	Spain 3,238; Denmark 1,970.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides _____	(1)	__		
Sodium carbonate, natural and manufactured_____	16	14	__	All from Denmark.
Sodium hydroxide _____	5	6	__	Do.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked _____	13	21	__	Do.
Worked_____	47	40	__	Denmark 39.
Gravel and crushed rock _____	246	9	__	All from Denmark.

See footnotes at end of table.

Table 7.—Greenland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Quartz and quartzite	92	--		
Sand other than metal-bearing	43	407	--	Denmark 405.
Sulfur: Sulfuric acid	23	19	--	All from Denmark.
Other:				
Crude	67	65	--	Do.
Slag and dross, not metal-bearing	25	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1,277	1,104	--	All from Denmark.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	393	--		
Carbon: Carbon black	--	132	--	All from Denmark.
Coal:				
Anthracite and bituminous	1,926	2,150	--	Do.
Lignite including briquets	1	--		
Peat including briquets and litter	12	5	--	All from Denmark.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	4,478	882	--	Do.
Gasoline do	67,286	92,047	--	United Kingdom 32,521; Netherlands 25,628; Denmark 17,578.
Mineral jelly and wax do	8	8	--	All from Denmark.
Kerosine and jet fuel do	31,612	51,445	--	United Kingdom 25,428; Belgium-Luxembourg 22,436.
Distillate fuel oil do	1,251	1,136	--	Norway 315; Denmark 312; United Kingdom 259.
Lubricants do	11,760	9,884	(1)	Denmark 9,856.
Bitumen and other residues do	764	127	--	All from Denmark.
Bituminous mixtures do	2,969	1,691	--	Denmark 1,679.
Tars and other crude chemicals derived from coal, gas, and petroleum	7	8	--	All from Denmark.

[1]Less than 1/2 unit.

The Mineral Industry of Egypt

By Peter J. Clarke[1]

The rapid economic growth that Egypt experienced from the early 1970's through 1981 leveled off rather abruptly in 1982, as a result of the declining value of petroleum exports. Annual growth in the gross domestic product (GDP) had averaged 8% to 9% between 1975 and 1981 but increased by only 5% to $32.5 billion in 1982.[2] Mining and industry contributed about 15% of the GDP, with the primary mineral commodities being petroleum, phosphate rock, fertilizer, aluminum, iron and steel, salt, clays, and construction materials.

In 1982, Egypt's petroleum surplus (exports minus imports) actually declined, from $2.76 billion in 1981 to $2.43 billion in 1982. Even with moderate increases in foreign remittances, Suez Canal receipts, and tourism revenues, Egypt's increasing level of total imports resulted in a $4.2 billion merchandise trade deficit and a $2.4 billion current account deficit.

The Egyptian Government was strongly emphasizing development of the industrial and agricultural sector in order to restore economic health to the country. Also of primary importance was the reduction of the Government's excessive $5.7 billion budget deficit, mainly through cutting back on the expensive subsidies program. Part of the Government's industrial promotion program involved seeking foreign participation for new ventures in the mineral sector.

Mineral development in 1982 centered on further expansion of petroleum and phosphatic fertilizer production capacity and construction of a new direct-reduction-based steel mill at El-Dekheila. The Government also planned to develop new industries in the Sinai Peninsula, among which were the planned reconstruction of the manganese mines and ferromanganese smelter at Abu Zeneima and the reopening of the coal mines at El-Maghara. The U.S. Agency for International Development (AID) was also conducting a multi-billion-dollar assistance program in Egypt, part of which was a $20.7 million mineral, petroleum, and ground water assessment program in cooperation with the Egyptian Geological Survey and Mining Authority (EGSMA) and the Egyptian General Petroleum Corp. (EGPC). Work on the survey should be completed by 1984 and provide information on potential commercial deposits of gold, lead, iron, phosphate, uranium, petroleum, and other minerals.

PRODUCTION AND TRADE

Production of most of Egypt's major mineral commodities increased in 1982, led by petroleum, natural gas, iron ore, cement, barite, and to a lesser extent, phosphate rock. The mineral sector continued to be dominated by oil and gas production, with phosphate being the largest nonfuel mineral foreign exchange earner. Petroleum production averaged 673,000 barrels per day in 1982, a 5% increase above the 1981 level. Production was expected to continue to increase throughout the 1980's as new fields in the Gulf of Suez and Western Desert are brought onstream and the natural-gas-gathering system is implemented.

While production of phosphate rock increased slightly in 1982, the value of phosphate exports declined 2% to $6 million during the year. Also, development plans for the Abu Sheigela and Abu Tartur phos-

phate mines were shelved in 1982 owing to development cost problems and lack of an export market.

Iron ore production continued to increase from the Bahariya Oasis deposit in the Western Desert. All of this production, along with a considerable level of imports, will be necessary to supply the planned El-Dekheila direct-reduction steel mill, which was under construction in 1982. Coal production from the El-Maghara coal deposit in northern Sinai was expected to reduce the coking coal import needs of the country's steel industry; ferromanganese production, also from the Sinai, was expected to provide raw material for the steel mill as well. Total revenues from Egypt's mineral exports, excluding oil and gas, amounted to $6.6 million in 1982, with phosphates accounting for 90% of the total. Total revenues from oil and gas exports amounted to $3.2 billion in 1982, making petroleum the most important commodity in the economy overall.

Egypt's major mineral exports were petroleum, phosphates, aluminum, iron and steel, and salt. Egypt's crude oil was delivered to Italy (35%), Israel (30%), Greece (7%), and the United States (5%). Phosphate rock was exported mainly to China, India, and Romania, while aluminum went mainly to the Netherlands, Japan, and the Republic of Korea. Total Egyptian exports to the United States were valued at $500 million in 1982, composed mostly of petroleum products. U.S. AID operated its largest assistance program worldwide in Egypt, having disbursed $5 billion in aid since 1975, about $1.5 billion of which was released in 1982.

Egypt's overall external trade position was unfavorable in 1982. Merchandise exports totaled $4.2 billion in 1982, while imports reached $9.2 billion. Even with a $500 million surplus in the services sector and the $3.1 billion in aid and transfer payments, Egypt finished 1982 with a $2.4 billion current account deficit.

Table 1.—Egypt: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal	100,698	77,204	120,000	[2]133,812	140,000
Chromite	873	22	--	--	--
Copper, refined, secondary	2,000	2,000	2,000	2,000	[2]2,400
Iron and steel:					
Iron ore and concentrate thousand tons	1,456	1,435	1,776	[2]1,943	[2]2,140
Pig iron do	600	600	[e]650	650	700
Ferroalloys: Ferrosilicon do	[e]5	--	--	--	--
Crude steel do	600	800	800	900	[2]1,000
Semimanufactures do	1,000	[e]1,000	847	850	900
Manganese ore and concentrate	173	--	--	--	--
NONMETALS					
Asbestos	349	238	316	325	[2]424
Barite	989	[r]2,136	4,532	[2]2,108	[2]3,101
Cement: Hydraulic thousand tons	3,000	2,957	3,028	[2]3,499	[2]4,260
Clays:					
Bentonite	3,448	3,500	5,200	5,200	5,200
Fire clay	383,389	250,000	942,000	[2]995,000	[2]975,263
Kaolin	55,577	46,544	41,227	[2]32,113	[2]49,787
Diatomite	99	33	--	--	--
Feldspar, crude	3,337	3,271	3,309	[2]3,480	[2]8,436
Gypsum and anhydrite, crude	798,000	796,000	940,000	950,000	[2]931,150
Lime	100,000	88,000	87,000	[2]91,294	94,000
Mica	[e]86	--	--	--	--
Nitrogen: N content of ammonia thousand tons	250	263	400	[2]518	[2]639
Phosphate:					
Phosphate rock do	639	623	658	679	[2]691
Thomas slag do	NA	9	10	10	10
Pigments, mineral, natural: Iron oxide	245	140	126	130	130
Pumice[e]	NA	NA	NA	NA	NA
Salt, marine thousand tons	755	616	636	[r]679	[2]829
Sodium compounds:					
Sodium carbonate	4,000	[e]5,000	4,675	4,700	[2]22,909
Sodium sulfate	2,902	2,902	2,942	3,000	3,000
Stone, sand and gravel:					
Basalt thousand cubic meters	281	85	96	[2]103	[2]90

See footnotes at end of table.

Table 1.—Egypt: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Stone, sand and gravel —Continued					
Dolomite thousand tons	130	504	500	500	500
Granite, dimension cubic meters	NA	2,666	6,408	6,400	[2]4,765
Gravel thousand cubic meters	2,090	[e]3,300	3,400	3,400	[2]6,480
Limestone and other calcareous n.e.s do	5,667	5,845	5,196	[2]5,535	[2]7,037
Marble blocks (including alabaster) cubic meters	25,718	26,000	32,000	[2]46,930	[2]19,380
Quartz	11,348	[e]10,000	10,000	10,000	10,000
Sand including glass sand thousand cubic meters	2,996	6,147	6,000	6,200	[2]6,874
Sandstone do	111	787	32	32	[2]785
Sulfur:					
Elemental, byproduct	3,106	3,206	3,300	[2]2,408	[2]2,281
Sulfuric acid	NA	3,200	32,000	[2]44,111	[2]45,118
Talc, steatite, soapstone, pyrophyllite	5,905	4,406	4,007	[2]5,723	[2]8,291
MINERAL FUELS AND RELATED MATERIALS					
Coke:					
Oven and beehive thousand tons	700	853	915	920	[2]974
Gashouse and other low temperature do	[e]40	[e]50	NA	NA	NA
Total do	740	903	915	920	974
Gas, natural:					
Gross production million cubic feet	[e]105,800	[e]140,000	84,624	108,000	114,074
Marketed do	30,835	120,000	60,000	70,000	78,000
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	175,925	180,000	227,395	234,330	[2]245,645
Refinery products:					
Gasoline and naphtha do	8,109	8,840	15,068	16,000	16,200
Kerosine and jet fuel do	12,849	12,710	13,361	13,208	14,100
Distillate fuel oil do	16,412	17,205	18,791	19,000	19,250
Residual fuel oil do	36,210	52,281	47,841	49,004	52,650
Lubricants do	434	461	539	600	650
Liquefied petroleum gas do	NA	1,150	1,612	1,800	1,900
Asphalt do	6,115	1,127	1,654	1,800	1,900
Unspecified do	NA		292	400	450
Refinery fuel and losses do	2,631	4,242	4,500	4,600	4,650
Total do	NA	98,016	103,658	106,412	111,750

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 23, 1983.
[2]Reported figure.

Table 2.—Egypt: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	33,170			
Unwrought	139	76,466	--	Netherlands 50,644; Japan 8,709; Republic of Korea 8,432.
Semimanufactures	12,425	12,826	--	Netherlands 5,618; Japan 3,006; Saudi Arabia 2,066.
Iron and steel: Metal:				
Steel, primary forms	--	96	--	All to Ethiopia.
Semimanufactures:				
Bars, rods, angles, shapes, sections	134			
Universals, plates, sheets	50,792	14,490	--	Belgium-Luxembourg 5,533; Italy 3,499; Sudan 1,729.
Wire	--	5	--	All to Sudan.
Tubes, pipes, fittings	411	1,887	--	Sudan 1,881; France 6.
Castings and forgings, rough	--	1,500	--	Nigeria 1,400; Saudi Arabia 86; Sudan 14.

Table 2.—Egypt: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead: Metal including alloys, semimanufactures	3	--		
Zinc:				
Oxides	3	--		
Metal including alloys, scrap	--	10	--	All to Spain.
NONMETALS				
Cement	750	2,450	--	All to Sudan.
Clays and clay products:				
Crude, unspecified	1,500	--		
Products:				
Nonrefractory	50	--		
Refractory including nonclay brick	47	55	--	Lebanon 50; Sudan 5.
Feldspar, fluorspar, related materials	10	--		
Fertilizer materials: Manufactured:				
Nitrogenous	11,105	--		
Phosphatic	10,200	--		
Lime	--	1,000	--	All to Kuwait.
Phosphates, crude	25,945	55,817	--	China 27,287; India 12,600; Romania 11,730.
Salt and brine	49,407	19,500	--	Bulgaria 12,800; Kuwait 3,000; Rwanda 2,000.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	769	389	--	All to Italy.
Gravel and crushed rock	--	3	--	All to Kuwait.
Talc, steatite, soapstone, pyrophyllite	580	660	--	East Germany 350; Yugoslavia 200; West Germany 60.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1,227	2,050	--	Saudi Arabia 1,969; Sudan 81.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,580	1,866	--	All to Italy.
Carbon: Carbon black and gas carbon	8,773	--		
Coke and semicoke	9,145	31,885	--	Romania 24,360; Lebanon 7,525.
Petroleum and refinery products:				
Crude, thousand 42-gallon barrels	57,961	52,041	2,617	Italy 19,353; Israel 15,989; Greece 4,201.
Refinery products:				
Mineral jelly and wax do.	--	78	--	West Germany 61; Netherlands 17.
Kerosine and jet fuel do.	--	4,320	--	Italy 2,338; France 1,690; Netherlands 292.
Distillate fuel oil do.	--	1,141	--	All for bunkers.
Nonlubricating oils do.	6,722	--		
Residual fuel oil do.	--	5,798	--	Italy 2,268; France 650; bunkers 2,706.
Petroleum coke do.	2	--		
Tars and other crude chemicals derived from coal, gas, and petroleum	3,738	1,670	--	Switzerland 1,070; Italy 600.

Table 3.—Egypt: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	2	9	--	Spain 8; United Kingdom 1.
Aluminum:				
Ore and concentrate	--	1,000	--	All from Netherlands.
Oxides and hydroxides	492	652	--	West Germany 308; United Kingdom 123; Italy 108.
Metal including alloys:				
Scrap	1,587	5	NA	NA.
Unwrought	3	491	--	All from Canada.
Semimanufactures	2,786	3,447	1,255	West Germany 566; Italy 499; Spain 234.
Chromium: Oxides and hydroxides	110	64	--	U.S.S.R. 53; Spain 6; Italy 3.
Cobalt: Oxides and hydroxides	(1)	3	--	All from United Kingdom.
Copper:				
Matte and speiss	90	--		

See footnotes at end of table.

Table 3.—Egypt: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Copper —Continued				
Metal including alloys:				
Scrap	1,391	--	--	
Unwrought	--	2,534	--	Zambia 1,502; France 1,002.
Semimanufactures	3,270	8,281	755	France 1,702; Belgium-Luxembourg 1,332; Greece 1,103.
Iron and steel:				
Iron ore and concentrate: Pyrite, roasted	5,000	5,000	--	All from Cyprus.
Metal:				
Scrap	37,095	13,804	4,633	Zaire 3,749; Spain 1,167; Italy 1,026.
Pig iron, cast iron, related materials	6,214	31,075	--	West Germany 13,039; North Korea 10,000; Turkey 7,616.
Ferroalloys	310	1,895	--	Zimbabwe 1,486; West Germany 145; Czechoslovakia 102.
Steel, primary forms	63,245	12,866	--	West Germany 11,714; India 161.
Semimanufactures:				
Bars, rods, angles, shapes, sections	747,031	766,387	13,522	Romania 139,698; Czechoslovakia 98,305; West Germany 59,997.
Universals, plates, sheets	84,424	138,945	37,546	West Germany 24,052; Italy 16,788; Bulgaria 13,896.
Hoop and strip	1,057	5,777	1,172	Sweden 1,493; West Germany 1,489; Turkey 980.
Rails and accessories	8,820	3,628	1,145	Italy 917; West Germany 738; Poland 405.
Wire	7,312	14,652	67	China 6,020; West Germany 5,108; Belgium-Luxembourg 834.
Tubes, pipes, fittings	75,855	78,934	3,723	Japan 32,902; West Germany 12,124; France 11,992.
Castings and forgings, rough	--	18,525	2,758	Italy 5,848; West Germany 2,413; France 1,547.
Lead:				
Oxides	1,252	4,454	11	France 1,686; West Germany 839; Belgium-Luxembourg 685.
Metal including alloys:				
Scrap	--	300	300	
Unwrought	9,106	6,806	--	Australia 3,000; Netherlands 2,746; Switzerland 585.
Semimanufactures	128	29	1	United Kingdom 22; West Germany 5.
Magnesium: Metal including alloys, all forms	19	155	--	Norway 120; Switzerland 35.
Manganese:				
Ore and concentrate	--	100	--	All from Belgium-Luxembourg.
Oxides	791	3,909	--	Japan 1,996; Belgium-Luxembourg 1,561; Switzerland 286.
Mercury 76-pound flasks	580	406	--	United Kingdom 232; Netherlands 145.
Metalloids:				
Arsenic: Oxides and acids	29	--		
Unspecified	31	87	--	West Germany 68; Netherlands 12; India 7.
Molybdenum: Metal including alloys, all forms value, thousands	--	$10	--	All from Switzerland.
Nickel:				
Matte and speiss	3	13	--	Do.
Metal including alloys:				
Scrap	--	1	--	All from United Kingdom.
Unwrought	--	16	--	Belgium-Luxembourg 13; West Germany 3.
Semimanufactures	27	54	3	United Kingdom 18; Canada 16; West Germany 12.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$1	--	All from West Germany.
Silver: Metal including alloys, unwrought and partly wrought do.	$403	$1,062	--	Switzerland $589; United Kingdom $456.
Tin:				
Oxides	55	--		
Metal including alloys:				
Scrap	--	1	--	All from United Kingdom.
Unwrought	35	52	--	Singapore 50; United Kingdom 2.
Semimanufactures	(1)	5	(1)	Japan 3; United Kingdom 1.
Titanium: Oxides	1,905	1,995	--	West Germany 887; France 599; United Kingdom 250.
Tungsten: Metal including alloys, all forms	(2)	11	8	Netherlands 3.
Uranium and/or thorium: Metal including alloys, all forms value, thousands	$54	--		

See footnotes at end of table.

Table 3.—Egypt: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Oxides	436	452	--	France 373; Netherlands 30; United Kingdom 29.
Blue powder, value, thousands	$5	--		
Metal including alloys:				
Scrap	2	30	--	Netherlands 15; Switzerland 15.
Unwrought	2,729	7,515	--	Switzerland 4,415; Zaire 2,000; North Korea 1,000.
Semimanufactures	634	715	4	West Germany 527; Netherlands 150; U.S.S.R. 22.
Other:				
Ores and concentrates	704	250	--	Netherlands 204; West Germany 42; France 4.
Pyrophoric alloys	19	--		
Base metals including alloys, all forms	4	108	--	U.S.S.R. 50; United Kingdom 42; Belgium-Luxembourg 15.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	51	825	2	United Kingdom 407; West Germany 306; Italy 109.
Artificial: Corundum	53	(1)	NA	NA.
Grinding and polishing wheels and stones	506	1,525	14	Italy 746; Denmark 157; West Germany 140.
Asbestos, crude	4,387	26,828	--	Canada 12,592; Switzerland 6,085; U.S.S.R. 5,008.
Barite and witherite	254	100	--	West Germany 84; Netherlands 16.
Boron materials: Oxides and acids	152	102	--	U.S.S.R. 100; West Germany 1; Netherlands 1.
Cement, thousand tons	2,849	4,229	7	Greece 2,381; Spain 1,056; Romania 617.
Chalk	14	31	(1)	West Germany 27; United Kingdom 4.
Clays and clay products:				
Crude, unspecified	9,606	16,819	797	United Kingdom 8,682; Czechoslovakia 1,523.
Products:				
Nonrefractory	31,862	54,522	138	Spain 26,302; Italy 13,711; Romania 6,914.
Refractory including nonclay brick	13,701	70,238	1,152	Italy 15,490; West Germany 11,964; Spain 11,372.
Diatomite and other infusorial earth	118	434	124	West Germany 209.
Feldspar, fluorspar, related materials	6,992	8,868	--	China 6,962; Norway 1,713; Italy 169.
Fertilizer materials:				
Crude, n.e.s	3	10	--	All from France.
Manufactured:				
Ammonia	3	177	--	West Germany 176; United Kingdom 1.
Nitrogenous	256,724	531,046	10,500	Romania 273,061; U.S.S.R. 81,431; Bulgaria 25,084.
Phosphatic	41,180	116,796	--	Lebanon 49,651; Tunisia 33,230; France 20,500.
Potassic	5,025	24,814	--	Spain 10,552; West Germany 8,200; Switzerland 6,060.
Unspecified and mixed	11,877	10,003	21	Romania 7,869; West Germany 1,761; Switzerland 258.
Graphite, natural	101	812	1	Italy 378; China 371; West Germany 40.
Gypsum and plaster	--	625	--	West Germany 405; United Kingdom 104; Cyprus 42.
Halogens:				
Chlorine	--	108	8	West Germany 100.
Unspecified	--	20	--	United Kingdom 10; West Germany 5; Netherlands 5.
Lime	1	1,098	--	Bulgaria 1,088; Denmark 10.
Magnesium compounds: Magnesite	106	6,134	--	China 5,030; Austria 624; India 418.
Mica:				
Crude including splittings and waste	83	180	18	India 157.
Worked including agglomerated splittings	5	15	--	India 5; Italy 2.
Pigments, mineral:				
Natural, crude	331	--		
Iron oxides and hydroxides, processed	2,038	1,852	--	China 460; Japan 419; Switzerland 376.
Precious and semiprecious stones other than diamond, value, thousands	$35	--		

See footnotes at end of table.

Table 3.—Egypt: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pyrite, unroasted	--	55,155	6,500	Italy 10,965; Norway 10,000; United Kingdom 9,250.
Salt and brine	71	172	23	West Germany 89; United Kingdom 34; Poland 25.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	106	255	--	France 108; Spain 50; Belgium-Luxembourg 45.
Sodium carbonate, natural and manufactured	4,730	779	610	Switzerland 80; Australia 51; United Kingdom 25.
Sodium hydroxide	64,552	32,983	139	West Germany 19,602; Romania 8,096; Italy 3,859.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	14,991	42,397	9	Italy 36,429; Greece 2,512; Spain 1,615.
Worked	2,360	7,047	9	Spain 4,647; Italy 2,077; Greece 252.
Gravel and crushed rock	614	387	--	Finland 204; West Germany 121; United Kingdom 41.
Quartz and quartzite	44	18	16	West Germany 2.
Sand other than metal-bearing	2,602	2,547	2	Belgium-Luxembourg 2,037; Denmark 500.
Sulfur:				
Elemental:				
Crude including native and byproduct	70,595	59,428	59,388	West Germany 23; France 17.
Colloidal, precipitated, sublimed	--	54	--	West Germany 38; United Kingdom 13; France 3.
Sulfuric acid	15	35	22	Japan 10; West Germany 2.
Talc, steatite, soapstone, pyrophyllite	140	526	--	Norway 290; Finland 110; France 100.
Other:				
Crude	262	198	--	All from Sudan.
Oxides and hydroxides of barium, magnesium, strontium	49	11	--	West Germany 5; Italy 2; Netherlands 2.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	2,350	16,008	56	Spain 9,429; Italy 4,234; France 1,176.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	[1]	--		
Carbon: Carbon black and gas carbon	3,323	954	28	West Germany 454; Netherlands 204; China 102.
Coal: All grades excluding briquets thousand tons	802	1,267	635	U.S.S.R. 409; Australia 211.
Coke and semicoke	--	6,015	--	West Germany 5,134; Spain 618; United Kingdom 263.
Peat including briquets and litter	3,900	5,857	--	Ireland 4,431; Netherlands 719; U.S.S.R. 400.
Petroleum and refinery products:				
Crude 42-gallon barrels	146	--		
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1,448	1,746	--	Italy 1,013; Greece 332; United Kingdom 166.
Gasoline 42-gallon barrels	--	1,598	--	Netherlands 1,292; Italy 306.
Mineral jelly and wax do	16,134	30,189	--	China 20,989; West Germany 8,751.
Kerosine and jet fuel do	3,472	9,695	16	United Kingdom 4,859; Italy 3,580.
Distillate fuel oil thousand 42-gallon barrels	--	1,520	--	U.S.S.R. 413; United Kingdom 191; Israel 189.
Lubricants do	378	789	74	Greece 239; United Kingdom 158; Italy 102.
Nonlubricating oils 42-gallon barrels	24,801	--	--	
Pitch and pitch coke do	--	110,740	--	West Germany 60,951; Switzerland 30,300; France 19,113.
Bitumen and other residues do	--	85,240	--	France 51,304; Switzerland 30,300; Cyprus 3,636.
Bituminous mixtures do	51,062	1,315	648	United Kingdom 418; West Germany 139.
Petroleum coke do	19,492	88,060	--	Switzerland 55,000; Lebanon 18,728; France 11,033.
Tars and other crude chemicals derived from coal, gas, and petroleum	9,047	757	--	Italy 512; Brazil 100; India 100.

NA Not available.
[1]Less than 1/2 unit.
[2]Unreported quantity valued at $190,000.

COMMODITY REVIEW

METALS

Aluminum.—Production from the state-owned Aluminum Co. of Egypt increased 5% in 1982 to 140,000 tons of primary aluminum. Capacity of the plant was expanded in 1981 from 133,000 to 166,000 tons per year through the addition of two new potlines. Production did not increase as much as planned, however, because of a shortage of electricity to operate the new potlines. The Aluminum Co., located at Nag Hammadi 550 kilometers south of Cairo on the Nile River, utilizes electricity produced at the Aswan High Dam. Initially, the plan was for the dam to produce 1,400 megawatts of electricity, only 1,000 megawatts of which could be handled by the transmission lines to Cairo and northern Egypt. The aluminum plant, located between Aswan and Cairo, was to use the surplus. The Aswan High Dam, however, has been producing only 900 to 1,000 megawatts in 1982, owing to problems with the turbine generators, and the aluminum plant has been utilizing fully one-third of that production. Addition of the 9th and 10th potline would raise consumption to 380 to 400 megawatts, leaving northern Egypt with a substantial electricity shortage. Increased production for the plant will have to wait for either a resolution of the conflict between the Ministry of Electricity and the management of The Aluminum Co., or an increase in electricity production from the Aswan High Dam.

Egypt continued to import its alumina for the plant from Australia, via the Red Sea port of Safâga. About 60% of the plant's output is exported, mainly to the Netherlands, Japan, and the Republic of Korea, with the remainder being consumed domestically. Egypt's domestic aluminum manufacturing facilities were the Arab Aluminium Co. facility at Ismailia and the Alsaad extrusion plant at Mostorod.

Columbium-Tantalum.—In 1982, EGSMA was negotiating with a West German company to develop two low-grade columbium-tantalum deposits, at Abu Dabbab and Abu Nuweibi. At Abu Dabbab, located in the Eastern Desert only 20 kilometers from the Red Sea, reserves were estimated at 32 million tons of granitic ore containing 0.025% Ta_2O_5 and 0.011% Cb_2O_5. The Abu Nuweibi deposit, located only 10 to 15 kilometers southeast of Abu Dabbab, contained 32 million tons of "higher grade" 0.015% Ta_2O_5 ore and 83 million tons of "lower grade" ore containing 0.012% Ta_2O_5 or less. While both of these deposits were being considered by EGSMA, the very low grade of the ore and the lack of any infrastructure or fresh water supply in the area make actual development unlikely.

Gold.—EGSMA has continued to express interest in reopening several of Egypt's ancient gold mines. The most promising of these was the Baramya gold mine, which closed when gold was selling for $35 per ounce. The mine, located in the Eastern Desert, reportedly contains 30 million tons of gold-bearing ore which averages 1 ounce of gold per ton. EGSMA also planned to do preliminary fieldwork at four gold mines: Atud, Um El Rus, Dongesh, and Talet Gadalla, beginning in the fall of 1983. EGSMA had no immediate plans to begin commercial operations at any these mines.

Iron and Steel.—Production of iron ore from the Bahariya Oasis deposit, located in the Western Desert 350 kilometers southwest of Cairo, continued to increase in 1982, reaching close to 2 million tons. Iron ore at Bahariya Oasis occurred in four ore bodies, located at Nasser, Gebel Ghorabi, El-Harra, and El-Gedida, all of middle Eocene age. Total reserves in the area were estimated at 250 million tons containing 52% to 54% iron. El-Gedida was currently the only deposit being worked, and reserves there were placed at 129 million tons of 53% iron ore. Production from the deposit began in 1973 and has increased fairly rapidly to close to 2 million tons per year. Maximum ore production capacity from the deposit was about 3 million tons per year, but output will not reach that level until the new steelworks at El-Dekheila is completed in 1986.

A progressively smaller portion of Egypt's iron ore continued to be supplied from Aswan, which for 25 years had been the main source of Egypt's iron ore supply. Reserves at Aswan have dwindled to 14 million tons containing 44% iron and 14% silica. Aside from its lower grade and higher silica content, Aswan was also considerably farther away from the main steelworks at Helwan, making ore transportation more expensive.

In 1982, Egypt's major steelmaking facility was the Egyptian Iron and Steel Co.'s works at Helwan, 33 kilometers south of Cairo, on the Nile River. The plant consisted of four blast furnaces, five Linz-Donawitz converters, and two electric-arc furnaces, with a total crude steelmaking capacity of 1.5 million tons per year. Substandard-quality ore feed kept production to about

60% of capacity. The company had begun research into beneficiation processes to improve the ore quality and reduce coke consumption.

Construction was progressing in 1982 on Egypt's first direct-reduction steel mill, to be located at El-Dekheila, near Alexandria. Equity shares in the project, formed as a joint Egyptian-Japanese venture under the name of the Alexandria National Steel Co., were held 87% by the Egyptian Government through various state-owned companies and 10% by the Japanese consortium composed of Nippon Kokan K.K. (5%), Kobe Steel Ltd. (3%), and Tokyo Menka Kaisha (2%); and the International Finance Corp. (IFC) held a 3% share in the project.

The plant was to have an annual steelmaking capacity of 723,000 tons based on the direct-reduction process. Bids were being accepted in 1982 on the direct-reduction unit, but only Kobe Steel and Kawaski Heavy Industries were expected to bid. Nippon will supply four 70-ton electric-arc furnaces, and Kobe Steel will supply three four-strand continuous casters for the plant, based on their equity participation. Financing for the $835 million plant was to be provided by the International Bank for Reconstruction and Development (World Bank) ($166 million), the IFC ($94 million), the Japanese Overseas Economic Cooperation Fund ($151 million), the Japanese Government ($138 million), and other Japanese, Egyptian, and commercial banks. The plant is expected to start up in mid-1986.

Manganese.—The Egyptian Government allocated close to $100 million to the Sinai Manganese Co. to renovate the mines and to reconstruct the ferromanganese plant at Abu Zeneima in Western Sinai that was destroyed during the Israeli occupation. The mines contained between 1 and 2 million tons of manganese-iron ore containing 22% to 38% Mn and 15% to 36% Fe. Output from the mines was to average 60,000 to 70,000 tons per year and would be used to produce 14,000 to 19,000 tons per year of ferromanganese alloy. The planned ferromanganese operation would more than meet the domestic requirements for ferromanganese in the steel industry until the new Alexandria steelworks comes on-stream. No timetable was established for construction or commissioning of the plant. The operation was expected to save $12 million per year in foreign currency now needed for ferromanganese imports.

Tin.—As part of the U.S. AID assistance program to Egypt, EGSMA planned to construct a small pilot plant at Gebel Igla on the Red Sea coast to process cassiterite ore from a small placer deposit nearby. The deposit contains only about 0.1% tin. EGSMA planned to produce 50 tons per year of tin concentrate, with reserves expected to last about 10 years.

NONMETALS

Cement.—Egypt's cement production increased substantially in 1982, by over 21% above the 1981 level. Total capacity of Egypt's cement plants was 5.4 million tons in 1982 and was scheduled to increase to 6.4 million tons in 1983. The increased production came from the Suez Cement Co.'s new 1.4-million-ton-per-year dry-process facility located at Qattanya, 55 kilometers from Suez City near the Red Sea. Suez Cement was the only privately owned cement plant operating in Egypt since the industry was nationalized in 1960. The new capacity due onstream in 1983 was the National Cement Co.'s 1-million-ton-per-year facility at Nag Hammadi.

Fertilizer Materials.—Egypt has remained virtually self-sufficient in nitrogenous fertilizer production since the Aswan High Dam was built and Egypt began to demand increasing quantities of chemical fertilizer to replace the natural fertilizer from the annual flooding of the Nile River. In 1982, Egypt maintained 1 million tons per year of nitrogen fertilizer capacity, along with 650,000 tons per year of phosphatic fertilizer capacity.

Nitrogen.—Ammonia and urea capacity was boosted to its current level by the 1981 commissioning of the Talkha II fertilizer complex, composed of a 326,000-ton-per-year (N) ammonia plant and a 262,000-ton-per-year (N) urea plant. Talkha I, brought onstream in 1975, and Talkha II both utilize natural gas feedstock pipelined from the Abu Madi Gasfield in the Nile Delta.

Phosphatic Fertilizer.—Construction neared completion at the end of 1982 on Egypt's largest phosphatic fertilizer complex, at Abu Zabal, located 20 kilometers north of Cairo. Up to 1982, Egypt had only produced single superphosphate from its four existing phosphate fertilizer plants. Abu Zabal was to produce 175,000 tons per year of triple superphosphate and 200,000 tons per year of phosphoric acid to be used in the production process. Also to be added to the plant were a 215,000-ton-per-year sulfuric acid unit and a plant to produce

100,000 tons per year of 65% oleum.

Phosphate Rock.—Phosphate rock was by far Egypt's most important nonfuel mineral export, earning approximately $6 million in foreign exchange in 1982. Production of phosphate rock increased only slightly in 1982. Phosphate rock was produced by three companies, from the Red Sea, Nile Valley, and Eastern Desert areas. The Red Sea Phosphate Co. has historically been the country's largest producer, from its two mines in the Red Sea region, at Quseir and Safâga. These two were the country's oldest mines and were to be phased out as a new mine, at Abu Sheigela in the Eastern Desert, was brought onstream. Longstanding plans to develop this deposit were shelved in 1982, however, owing to lack of demand.

The Misr Phosphate Co. of Egypt operated the Hamrawein deposit, also located in the Eastern Desert. Output from Hamrawein has exceeded production from the Red Sea mines, and is expected to remain the dominant producer. Reserves at Hamrawein were estimated at 40 million tons grading 17% to 25% P_2O_5. Total mine output in 1982 was close to 800,000 tons.

The third phosphate rock producer was the Abu Zabal Fertilizer and Chemical Co., which operated the West Sabaya Mine, 31 kilometers north of Idfu on the Nile River. Production from West Sabaya was to be expanded from its current level of about 600,000 tons per year of untreated ore to over 4 million tons of ore in order to supply the new triple superphosphate and phosphoric acid plant at Abu Zabal.

Egypt's longstanding plans to develop the 988-million-ton Abu Tartur phosphate deposit in the Western Desert came to a standstill in 1982 as negotiations with a European consortium were terminated for lack of financing. Egypt has reportedly already spent close to $130 million on an experimental mine and beneficiation plant and a railway linking the deposit with the Red Sea coast. Funds for the initial work were provided by the World Bank. However, a 1982 French-Swiss feasibility study indicated that the project may be uneconomic because of high mining and transportation costs, lack of a readily available export market, and the presence of an unusually high pyrite content, making beneficiation more difficult and costly. The Egyptians planned to produce 7 to 10 million tons per year of phosphate rock from the deposit, destined mainly for export.

Sulfur.—The Government of Egypt was working jointly with Agrico Chemical Co. of the United States in exploring for economic sulfur deposits in the Eastern Desert and Sinai. The Government was planning to enter into a joint venture with Agrico or other foreign firms in order to produce as much as 1 million tons per year of sulfur, 300,000 tons of which would be supplied to the domestic market, mostly for use in the fertilizer plants.

Other Nonmetals.—The Egyptian Government continued to evaluate several nonmetallic mineral projects in 1982, primarily involving gypsum, potash, and salt. The Egyptian Gypsum, Marble, and Quarries Co. was planning to construct a 300,000-ton-per-year gypsum plant in Alexandria, based on nearby deposits. Also, the Government was considering constructing another gypsum plant at Ras Malaab, on the Sinai Peninsula, to use gypsum from a deposit which had been mined in the early 1960's prior to the Israeli occupation. Reserves at Ras Malaab were estimated at 250 million tons.

EGSMA and the U.S. Geological Survey were evaluating the economic potential of a large potash deposit located in the Eastern Desert near the Red Sea. No information on the reserve level of the deposit was available.

Egypt planned to increase its salt production through the addition of a new sodium complex in Al Arish. The Government has allocated $41 million for construction of a 250,000-ton-per-year salt plant, which would satisfy Egypt's domestic requirement for table salt.

MINERAL FUELS

Coal.—A feasibility study by Babcock International and British Mining Corp. on the possibility of reopening the El-Maghara coal mine in northern Sinai was completed in 1982. The study placed reserves at Maghara at 27 million tons of high-volatile subbituminous coal, 21 million tons of which were recoverable. The coal would be used to blend with imported coking coal or possibly to fuel a planned 600-megawatt thermal powerplant to be built on the Sinai Peninsula. Coal was mined at El-Maghara from 1964 to 1967, but mining was suspended after the Israelis occupied the Sinai and removed all the equipment and blocked the shafts. According to the report, the shaft was in excellent condition, but many of the underground workings were flooded.

EGSMA planned to renovate the mine and Babcock Contractors was awarded the

contract for initiating the development work. In full operation, the project was to produce 600,000 to 750,000 tons per year of coal, which would require an investment of $120 million, including $85 million in foreign exchange.

Natural Gas.—The Egyptian Government remains committed both to increasing natural gas production and to utilizing to a greater extent its present gas output, much of which is now being flared, in order to free more crude oil for export. Production of associated and nonassociated gas continued to increase in 1982. Associated gas production increased about 6% in 1982, to 140 million cubic feet per day, driven by increased oil production, especially in the Gulf of Suez. EGPC was using a $75 million World Bank loan to construct a 40-million-cubic-foot-per-day gas-gathering station at Ras Bakr, in the Gulf of Suez, which will be linked by a 16-inch pipeline to the main gas-processing center at Ras Shukair.

Nonassociated gas production in Egypt was from three main fields: Abu Madi, Abu Qir, and Abu Gharadig. Production at the Abu Qir Field increased the most in 1982, by about 10%, from 100 to 110 million cubic feet per day. The expansion was brought about to provide additional feedstock to the Abu Qir fertilizer plant and the 65-million-cubic-foot-per-day gas-processing plant. Production from Abu Madi increased slightly in 1982, while production from Abu Gharadig remained about the same. Total nonassociated gas production in Egypt in 1982 was estimated at 175 million cubic feet per day. All of Egypt's recovered gas production was consumed domestically for industry fuel and feedstock and commercial and household use. The Egyptian Government decreed that no gas exports would be allowed until natural gas reserves reached 12 trillion cubic feet. Current proven gas reserves are placed at 5 to 6 trillion cubic feet.

Petroleum.—*Production.*—Egypt's petroleum production increased almost 5% in 1982, to an average of 673,000 barrels per day, moving gradually closer to the Government's stated goal of producing 1 million barrels per day by the mid to late 1980's. However, because of the worldwide slump in oil prices, Egypt's petroleum revenues declined substantially, from $2.76 billion in 1981 to $2.43 billion in 1982. Despite the decline in revenues, Egypt's petroleum outlook appeared very favorable in 1982. Offshore production from the Gulf of Suez at Ras Burden was expected to begin early in 1983 and reach 40,000 barrels per day by midyear, and onshore production was also expected to increase from the new fields in the Western Desert. The bulk of the increased crude oil production came from the Gulf of Suez oilfields, where the new discovery rate continued to be the highest.

The major oil-producing companies in Egypt were the Gulf of Suez Oil Co. (Gupco), owned by Amoco Oil Co. (United States) and EGPC, whose production averaged about 471,000 barrels per day; the Belayim Petroleum Co. (Petrobel), owned by Azienda Generale Italiana Petroli S.p.A. (Italy) and the Egyptian International Oil Co., whose production level averaged 129,000 barrels per day; the General Petroleum Co., owned by the Government through EGPC, which produced about 21,400 barrels per day; the Western Desert Petroleum Co., also known as Wepco, owned by Phillips Petroleum Corp. (United States), which produced 9,000 barrels per day; and the Suez Oil Co. (SUCO), owned jointly by British Petroleum Ltd. (United Kingdom), Royal Dutch/Shell (Netherlands), and Deminex (Federal Republic of Germany), which produced about 4,000 barrels per day. Epedeco, a Japanese consortium, produced about 5,000 barrels per day, and the Shukair Offshore Co., also known as OSOCO, produced about 1,100 barrels per day. The remaining 30,000 barrels per day was produced from the Sho'ab Ali Field, formerly known as the Alma Field, which was repossessed from Israel along with the return of the Sinai Peninsula. Sho'ab Ali was operated by Gupco.

Exploration.—Exploration activity continued to be centered in the Gulf of Suez region, but recent discoveries in the Western Desert and the offshore Mediterranean have heightened interest in those areas as well. Four new concessions were awarded by EGPC in 1982; three in the Gulf of Suez went to Deminex, Gulf Oil Co. (United States), and the British Petroleum-Société National Elf Aquitaine-Occidental Petroleum Co. consortium, and the fourth, in the Western Desert, went to Shell Winning N.V. (Netherlands). Since 1973, EGPC has entered into 112 concession agreements, nearly all with foreign companies. Five additional concession agreements were scheduled to take effect in 1983.

Refining.—Egypt's energy sector development plan also called for a substantial increase in petroleum refining capacity, from the current level of 292,000 barrels per

day to over 700,000 barrels per day by 1988. Egypt's refineries, along with their current and proposed expanded capacities, are shown in the following table.

Company	Location	1982 capacity (barrels per day)	Planned capacity (barrels per day)	Year of completion
Alexandria Petroleum Cement Co	Alexandria	64,000	159,500	1988
El-Nasr Petroleum Co	do	60,000	75,000	1983
	Suez	50,000	78,500	1985
	Suez (new complex)	XX	125,000	1986
Suez Oil Processing Co	Mostorod	78,000	114,500	1985
	Suez	20,000	42,500	1988
	Tanta	20,000	42,500	1988
Egyptian General Petroleum Corp	Assuit (new complex)	XX	106,000	1986
Total		292,000	743,500	

XX Not applicable.

As is evident from the table, refinery capacity by the end of the decade should approach current crude oil production. By that time, however, Egypt plans to be producing 1 million barrels per day, so even with a high growth rate in consumption, now estimated at 320,000 barrels per day, Egypt should be able to maintain at least its present level of crude oil exports, while substantially increasing its export of refined products. Work had already begun on EGPC's new refinery, at Assuit, which will be the first oil refinery in that area.

Also under construction in 1982 was Egypt's first petrochemical complex, a small-scale operation by recent Middle Eastern standards. The plant, to be owned by Egyptian Petrochemicals, a subsidiary of EGPC, is designed to produce 80,000 tons per year of polyvinyl chloride, 100,000 tons per year of vinyl chloride monomer, 200,000 tons per year of ethylene, 100,000 tons per year of low-density polyethylene, and 40,000 tons per year of high-density polyethylene. The contract for the polyvinyl chloride unit was awarded to Technipetrol, utilizing the BF Goodrich process. The plant should be completed in 1985. Production units for the other four petrochemical products were under study in 1982.

Uranium.—To provide fuel for Egypt's ambitious nuclear energy development program, Egypt has begun to produce uranium from a small research-oriented pilot-scale mining operation in the Eastern Desert, between Qena and Safâga. The mine started production in January 1980 and was producing at the rate of 20 to 30 tons of U_3O_8 per year. Reserves in the area were estimated at 5,000 tons of U_3O_8. The pilot plant was part of a 5-year research project being conducted by the Nuclear Materials Authority. Egypt planned to use the domestically produced uranium as fuel for the eight nuclear power reactors, all in the 900- to 1,200-megawatt range, that it planned to build before the year 2000.

[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Egyptian pounds (LE) to U.S. dollars at the rate of LE0.70=US$1.00.

The Mineral Industry of Finland

By Joseph B. Huvos[1]

In 1982, Finland's mining and metallurgical industry experienced a 1% decrease in value of output, brought about by reduced prices owing to the recession in the world economy. Devaluation of the Finnish markka increased prices at yearend. The consumer price index rose by 9%, and unemployment rose to about 6.5%.

Finland continued to be a modest producer of minerals including vanadium, cobalt, copper, nickel, zinc, chromite, apatite, ilmenite, talc, and wollastonite.

Important events in Finland's mineral industry included completion of Rautaruukki Oy's Laurinoja copper mine, Kemira Oy's Siilinjärvi phosphoric acid plant, Oy Partek AB's Lappeenranta wollastonite flotation plant, and expansion of Outokumpu Oy's Harjavalta copper smelter. Construction continued on expanding Outokumpu's cobalt salt plant and stainless steel plant. Mine closings included Outokumpu's Hitura nickel mine and Rautaruukki's Mustavaara vanadium mine.

PRODUCTION

Volume indexes (1980=100) of the country's mineral and related industries in 1981 and 1982 are shown in the following tabulation:

	1981	1982[p]
Mining and quarrying	104	107
Nonmetallic minerals processing	100	101
Iron and steel	96	98
Nonferrous metals	100	114
Petroleum refining	95	83
Industrial chemicals	96	94
All industry	103	101

[p]Preliminary.

Source: Central Statistical Office of Finland (Helsinki), Bulletin of Statistics, v. 58, No. 2, 1983, pp. 8-9.

Table 1.—Finland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
METALS					
Aluminum metal, secondary	7,000	8,000	8,000	9,000	9,200
Cadmium metal, refined	611	590	581	621	566
Chromium: Chromite:					
Gross weight:					
Lump ore	328,542	257,107	175,770	209,912	159,858
Concentrate	160,865	152,297	165,000	181,000	160,234
Foundry sand	17,559	25,289	21,400	21,400	24,926
Total	506,966	434,693	362,170	412,312	345,018
Cr_2O_3 content:					
Lump ore	86,078	69,419	NA	53,318	45,879
Concentrate	66,116	66,880	NA	72,207	64,254
Foundry sand	8,200	11,100	NA	10,073	11,566
Cobalt:					
Mine output, metal content	1,212	1,065	1,035	1,034	930
Metal, refined	922	1,162	1,151	1,229	1,455
Copper:					
Mine output, metal content	46,865	r41,065	36,918	38,539	34,836
Metal:					
Smelter:					
Primary	53,737	55,300	49,200	54,747	66,333
Secondary	9,990	9,900	10,000	12,950	19,051
Total	63,727	65,200	59,200	67,697	85,384
Refined:					
Primary	32,719	33,027	30,542	23,796	37,969
Secondary[e]	10,000	10,000	10,000	10,000	10,000
Total	42,719	43,027	40,542	33,796	47,969
Gold metal troy ounces	29,096	28,325	41,828	31,893	36,780
Iron and steel:					
Iron ore, marketable, all types:					
Gross weight thousand tons	1,088	1,144	1,172	1,230	1,082
Fe content do	712	738	755	789	703
Metal:					
Pig iron do	1,916	2,038	2,019	1,978	1,957
Ferroalloys: Ferrochromium do	45	49	53	52	55
Steel, crude:					
Ingots do	2,304	2,469	2,472	2,393	2,391
Castings do	29	30	37	35	23
Semimanufactures, rolled do	1,804	1,900	2,509	1,848	1,848
Lead:					
Mine output, metal content	790	1,000	1,134	1,942	1,883
Refined, secondary	3,000	3,000	3,200	4,500	4,400
Mercury 76-pound flasks	1,145	1,348	2,170	1,949	2,085
Molybdenum metal	--	104	114	165	216
Nickel:					
Mine output, metal content	4,170	5,800	6,531	6,864	6,216
Metal, electrolytic	7,501	11,460	12,807	13,310	12,615
Platinum-group metals:					
Palladium troy ounces	NA	932	675	1,993	4,662
Platinum do	640	711	225	1,608	4,147
Selenium metal kilograms	16,830	17,541	17,250	9,122	10,020
Silver metal troy ounces	1,068,850	1,027,729	1,429,581	1,215,457	1,188,399
Titanium concentrate: Ilmenite:					
Gross weight	131,900	119,700	159,000	161,500	167,800
Ti content	59,750	54,223	72,026	72,998	75,846
Vanadium (V_2O_5):					
Gross weight	5,007	4,941	5,076	5,557	5,619
V content	2,805	2,768	2,844	3,112	3,100
Zinc:					
Mine output, metal content	52,923	51,623	58,433	53,480	54,568
Metal	132,935	147,064	146,719	139,835	143,885
NONMETALS					
Cement, hydraulic thousand tons	1,704	1,749	1,793	1,787	1,794
Feldspar	71,330	67,928	74,089	63,066	69,600
Lime	194,101	e439,105	392,227	382,903	263,033
Mineral wool	68,239	103,639	140,900	140,500	105,623
Nitrogen: N content of ammonia	149,900	114,200	70,100	68,800	68,800
Phosphates, natural: Apatite thousand tons	4	3	138	201	233
Pyrite, gross weight	215,765	341,967	321,797	403,352	385,000
Sodium compounds: Sodium sulfate[e]	50,000	45,000	45,000	45,000	45,000

See footnotes at end of table.

Table 1.—Finland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
NONMETALS —Continued					
Stone:					
Limestone and dolomite:					
For cement manufacture thousand tons	2,287	2,339	2,534	2,416	2,446
For lime manufacture do	387	439	392	383	382
For sulfite and metallurgical use do	81	80	82	75	52
Other do	1,055	1,241	1,428	631	1,040
Quartz do	145	217	237	255	249
Sulfur:					
S content of pyrites do	87	151	144	184	177
Byproduct:					
Of metallurgy do	232	263	247	234	270
Of petroleum do	30	30	30	[e]30	10
Total do	349	444	421	448	457
Sulfuric acid do	849	1,048	1,039	1,095	1,222
Talc	195,159	267,180	317,901	307,915	325,000
Wollastonite	7,688	10,576	8,782	13,690	15,000
MINERAL FUELS AND RELATED MATERIALS					
Peat:					
For fuel use thousand tons	1,870	1,551	1,841	1,303	5,500
For agriculture and other uses do	203	773	578	204	88
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	16,737	17,508	16,449	17,434	16,890
Jet fuel do	1,765	1,806	1,944	1,984	1,720
Kerosine do	29	40	2,000	2,046	1,829
Distillate fuel oil do	26,993	28,000	5,505	3,827	2,865
Residual fuel oil do	24,707	24,997	28,372	21,672	16,004
Liquefied petroleum gas do	--	1,188	1,334	1,659	1,438
Other do	8,468	8,477	19,876	17,381	29,254
Refinery fuel and losses do	4,629	5,035	--	--	--
Total do	83,328	87,051	75,480	66,003	70,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 7, 1983.

TRADE

Finland's exports increased about 3%, but the current account deficit deteriorated. The net foreign debt was $5 billion.[2] U.S. share of Finnish exports was about 3%; that of imports was about 6%.

Table 2.—Finland: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	2	9	--	All to Japan.
Aluminum:				
Oxides and hydroxides	8	175	--	All to Sweden.
Metal including alloys:				
Scrap	102	255	--	Japan 216; Denmark 23; Republic of South Africa 16.
Unwrought	3,887	4,643	--	Japan 3,479; Sweden 835; Denmark 175.
Semimanufactures	28,796	22,758	51	United Kingdom 4,541; West Germany 3,402; Sweden 3,340.
Cadmium: Metal including alloys, all forms	565	554	40	United Kingdom 226; Sweden 76; Netherlands 62.
Chromium: Ore and concentrate	206,547	250,898	73,561	Sweden 157,641; Netherlands 6,472; United Kingdom 5,606.

Table 2.—Finland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Cobalt:				
Oxides and hydroxides ——— value	$521	$463	NA	NA.
Metal including alloys, all forms ———	1,201	1,564	563	Sweden 281; Netherlands 237; East Germany 113.
Columbium and tantalum: Metals including alloys, all forms, tantalum value, thousands	$7	--		
Copper:				
Ore and concentrate	15	--		
Matte and speiss including cement copper	81	33	--	All to Sweden.
Oxides and hydroxides	387	580	--	United Kingdom 482; Netherlands 40; Portugal 24.
Ash and residue containing copper	1,192	5	--	All to United Kingdom.
Metal including alloys:				
Scrap	234	242	6	Denmark 197; West Germany 20; Sweden 18.
Unwrought	5,945	22,749	37	Belgium-Luxembourg 10,078; United Kingdom 4,595; East Germany 4,017.
Semimanufactures	28,411	27,207	1,880	United Kingdom 5,322; Sweden 3,789; Denmark 3,123.
Gold: Metal including alloys, unwrought and partly wrought ——— troy ounces	19,419	18,294	--	West Germany 18,037; Sweden 161.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	14,628	22,965	22,965	
Metal:				
Scrap	194	206	--	Sweden 139; United Kingdom 53.
Pig iron, cast iron, related materials	17,520	274	--	United Kingdom 264; Iceland 5; Norway 3.
Ferroalloys, unspecified	16,982	25,460	1,051	Netherlands 10,903; Sweden 7,481; United Kingdom 5,003.
Steel, primary forms	129,465	206,169	--	Sweden 71,518; Venezuela 38,591; United Kingdom 25,905.
Semimanufactures:				
Bars, rods, angles, shapes, sections	174,515	149,426	7,680	U.S.S.R. 27,818; West Germany 27,549; United Kingdom 21,058.
Universals, plates, sheets	532,532	474,027	35,628	West Germany 169,011; Denmark 74,715; Sweden 42,646.
Hoop and strip	25,466	20,579	642	Sweden 5,992; West Germany 2,823; U.S.S.R. 2,658.
Rails and accessories	127	44	--	Iraq 10; Sweden 11.
Wire	2,685	2,404	118	Sweden 1,858; U.S.S.R. 109; United Kingdom 95.
Tubes, pipes, fittings	68,653	72,600	(1)	Sweden 22,274; U.S.S.R. 17,675; West Germany 6,852.
Castings and forgings, rough	3,255	3,418	1	Sweden 2,321; U.S.S.R. 609; Norway 335.
Lead:				
Ore and concentrate	2,047	3,135	--	All to West Germany.
Oxides	1	--		
Metal including alloys:				
Scrap	20	321	--	Sweden 195; Denmark 126.
Unwrought	869	853	--	Denmark 377; Sweden 319; Zambia 147.
Semimanufactures	45	104	--	Sweden 95; Iraq 5.
Magnesium: Metal including alloys:				
Scrap	31	33	--	All to West Germany.
Unwrought	--	1	--	All to Sweden.
Semimanufactures	--	49	--	All to U.S.S.R.
Manganese: Oxides	--	5	--	All to Sweden.
Mercury ——— 76-pound flasks	1,595	1,508	--	Belgium-Luxembourg 1,392; Sweden 87.
Metalloids: Unspecified	56	36	--	United Kingdom 21; Libya 6; Netherlands 5.
Molybdenum:				
Ore and concentrate	1	340	--	All to East Germany.
Metal including alloys, all forms	1	--		

See footnotes at end of table.

Table 2.—Finland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Ore and concentrate	1,657	--		
Matte and speiss	--	2,691	18	Norway 2,648.
Metal including alloys:				
Unwrought	11,104	11,135	2,969	United Kingdom 1,673; West Germany 1,008; Netherlands 1,005.
Semimanufactures	268	8	--	Greece 4; Sweden 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified troy ounces	354	1,350	--	Sweden 643; Netherlands 257; United Kingdom 257.
Silver:				
Ore and concentrate[2] value, thousands	$156	$465	--	All to United Kingdom.
Waste and sweepings[2] do	$7,509	$8,371	$1,769	United Kingdom $2,704; Sweden $1,655; West Germany $1,634.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,447	1,800	--	United Kingdom 1,157; West Germany 482.
Tin: Metal including alloys:				
Scrap	47	46	--	Sweden 38; West Germany 6.
Unwrought	5	5	--	Sweden 4; Iraq 1.
Semimanufactures	2	(1)	--	All to Iraq.
Titanium: Oxides	2,634	2,459	205	Hungary 785; East Germany 424; Sweden 378.
Tungsten: Metal including alloys,all forms	15	11	--	Belgium-Luxembourg 4; West Germany 4; Sweden 3.
Vanadium: Oxides and hydroxides value, thousands	$28,716	$25,468	$343	West Germany $8,683; United Kingdom $5,722; U.S.S.R. $3,541.
Zinc:				
Oxides	3	--		
Ash and residue containing zinc	1,469	1,315	--	Belgium-Luxembourg 687; West Germany 597.
Metal including alloys:				
Scrap	1,596	2,427	--	West Germany 1,093; United Kingdom 722; Norway 297.
Unwrought	120,613	116,069	28,453	United Kingdom 28,734; Netherlands 15,946; U.S.S.R. 10,613.
Semimanufactures	18	113	--	West Germany 83; U.S.S.R. 16; United Kingdom 9.
Other:				
Ores and concentrates value, thousands	$135	$463	--	All to United Kingdom.
Oxides and hydroxides	r120	19	--	Sweden 13; Libya 6.
Ashes and residues	r591	117	--	All to Denmark.
Cermets	--	2	--	Sweden 1.
Base metals including alloys, all forms	36	33	(1)	United Kingdom 21; Spain 10.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc. value, thousands	$3	--		
Grinding and polishing wheels and stones	83	129	(1)	U.S.S.R. 115; Iraq 4; Turkey 4.
Asbestos, crude	20	--		
Barite and witherite	18	--		
Boron materials: Crude natural borates	12	--		
Cement	66,129	69,685	--	U.S.S.R. 37,511; Sweden 30,287; Iraq 844.
Chalk	75	234	--	U.S.S.R. 160; Nigeria 73.
Clays and clay products:				
Crude:				
Fire clay	130	216	--	All to Sweden.
Unspecified	268	1,782	--	Norway 1,118; Sweden 611.
Products:				
Nonrefractory	1,963	2,134	11	U.S.S.R. 1,550; Sweden 403; Iraq 73.
Refractory including nonclay brick	4,018	7,028	--	Sweden 2,902; U.S.S.R. 1,877; Saudi Arabia 730.
Diamond: Gem, not set or strung value, thousands	$959	$381	$45	Sweden $182; Spain $57; Belgium-Luxembourg $56.
Diatomite and other infusorial earth	42	31	--	All to Sweden.
Feldspar, fluorspar, related materials:				
Fluorspar	312	1,096	--	Thailand 648; Venezuela 122; Nigeria 100.
Unspecified	46,998	46,725	--	United Kingdom 27,440; West Germany 9,664; Sweden 3,640.

See footnotes at end of table.

Table 2.—Finland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	--	320	--	Saudi Arabia 250; United Arab Emirates 60.
Manufactured:				
Ammonia	12	--		
Nitrogenous	8,644	31,145	--	India 11,999; Nigeria 10,552; Spain 3,578.
Phosphatic	11,425	796	--	U.S.S.R. 795.
Potassic	15,065	13,624	--	Japan 13,611; Sweden 13.
Unspecified and mixed	34,513	50,730	--	Venezuela 22,057; China 10,277; Angola 4,733.
Graphite, natural	1	2	--	All to Mexico.
Gypsum and plaster	--	101	--	West Germany 61; Sweden 25; Norway 15.
Halogens: Chlorine	18,882	32,880	--	U.S.S.R. 32,879.
Lime	1,046	933	--	U.S.S.R. 570; Sweden 219; West Germany 120.
Magnesium compounds: Other	(1)	137	--	Sweden 90; U.S.S.R. 25; Norway 22.
Mica:				
Crude including splittings and waste	1	--		
Worked including agglomerated splittings value, thousands	$2	$1	--	All to Sweden.
Phosphates, crude	1,677	131	--	Sweden 101; Australia 30.
Pigments, mineral: Iron oxides and hydroxides, processed	3	2	--	All to Nigeria.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$56	$10	--	West Germany $6; Hong Kong $2; Sweden $2.
Synthetic do	$998	$1,080	$1,080	
Pyrite, unroasted	--	69,538	--	Italy 28,986; Sweden 20,252; Turkey 14,678.
Salt and brine	199	242	--	Denmark 196; Sweden 28; Iraq 5.
Sodium and potassium compounds, n.e.s.:				
Sodium hydroxide	6,038	24,024	--	U.S.S.R. 24,013; Algeria 11.
Sodium sulfate, natural and manufactured	3,328	3,969	--	Bulgaria 2,224; United Kingdom 996.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	281,584	432,554	151	Netherlands 238,889; Italy 106,871; France 44,367.
Worked	1,705	2,454	--	U.S.S.R. 1,085; Sweden 780; West Germany 303.
Dolomite, chiefly refractory-grade	40	--		
Gravel and crushed rock	193,848	113,910	1	Netherlands 80,029; Sweden 24,355; U.S.S.R. 8,879.
Limestone other than dimension	14,062	12,442	--	Sweden 10,889; Denmark 1,490.
Quartz and quartzite	10,131	6,253	16	Sweden 2,706; Indonesia 702; United Kingdom 666.
Sand other than metal-bearing	11,413	20,595	--	Sweden 20,093; Japan 406; U.S.S.R. 66.
Sulfur:				
Elemental: Crude including native and byproduct	6	6	--	All to Nigeria.
Dioxide	34	12	--	All to Sweden.
Talc, steatite, soapstone, pyrophyllite	54,044	60,314	--	Sweden 20,621; U.S.S.R. 12,861; West Germany 7,784.
Other:				
Crude	10,326	11,138	--	West Germany 4,029; Italy 1,729; Spain 1,694.
Slag and dross, not metal-bearing	6,507	6,756	--	Sweden 6,632; Belgium-Luxembourg 59.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	5,670	9,166	--	Norway 2,479; U.S.S.R. 2,469; Denmark 1,702.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,474	594	--	U.S.S.R. 432; Libya 86; Sweden 56.
Carbon: Carbon black	6,729	9,745	--	Ireland 7,254; United Kingdom 2,455.
Coal: Bituminous	21	3	--	NA.
Coke and semicoke	5,473	7,537	--	Norway 3,793; Iceland 2,950; Sweden 497.
Hydrogen, helium, rare gases	370	508	--	Norway 284; Sweden 163; Denmark 60.

See footnotes at end of table.

Table 2.—Finland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Peat including briquets and litter	42,660	74,145	--	Sweden 45,538; Netherlands 9,589; Denmark 5,335.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	220	986	--	U.S.S.R. 464; Sweden 313; Denmark 93.
Gasoline thousand 42-gallon barrels	7,263	6,408	--	Sweden 3,222; Netherlands 1,020; United Kingdom 823.
Mineral jelly and wax 42-gallon barrels	102	1,731	--	Norway 1,550; Sweden 150.
Kerosine and jet fuel do	122,334	140	--	U.S.S.R. 116; Norway 24.
Distillate fuel oil thousand 42-gallon barrels	3,645	5,482	--	Sweden 1,718; West Germany 1,528; Denmark 761.
Lubricants 42-gallon barrels	88,634	96,397	154	U.S.S.R. 91,000; Sweden 1,925; Iraq 770.
Residual fuel oil thousand 42-gallon barrels	4,967	2,155	--	Sweden 1,198; Norway 364; Netherlands 362.
Bitumen and other residues 42-gallon barrels	17,313	77,877	--	Sweden 70,720; U.S.S.R. 6,072; Iraq 939.
Bituminous mixtures do	21,646	20,071	--	U.S.S.R. 17,629; Sweden 1,121; Iraq 782.
Petroleum coke do	--	6	--	All to Sweden.
Tars and other crude chemicals derived from coal, gas, and petroleum	3	9	--	U.S.S.R. 8; Iraq 1.

[r] Revised. NA Not available.
[1] Less than 1/2 unit.
[2] May include other precious metals.

Table 3.—Finland: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	10	9	(1)	West Germany 8.
Aluminum:				
Ore and concentrate	4,131	3,925	--	West Germany 2,645; Denmark 763; Italy 198.
Oxides and hydroxides	29,259	31,414	26	Hungary 12,552; China 9,216; West Germany 7,811.
Metal including alloys:				
Scrap	2,475	6,080	18	U.S.S.R. 2,626; Norway 2,266; Hungary 348.
Unwrought	26,737	28,750	197	U.S.S.R. 10,225; United Kingdom 4,268; Norway 4,254.
Semimanufactures	35,008	26,901	648	Norway 5,268; Sweden 4,553; West Germany 4,418.
Antimony: Metal including alloys, all forms	15	20	--	Denmark 9; Bolivia 5; West Germany 2.
Beryllium: Metal including alloys, all forms value, thousands	$2	$2	--	West Germany $1; United Kingdom $1.
Cadmium: Metal including alloys, all forms do	(1)	$3	--	NA.

See footnotes at end of table.

Table 3.—Finland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate	--	20	--	All from Netherlands.
Oxides and hydroxides	868	737	--	West Germany 421; China 174; U.S.S.R. 50.
Cobalt:				
Oxides and hydroxides	246	(1)	--	Mainly from Canada.
Metal including alloys, all forms	7	252	--	Sweden 249.
Columbium and tantalum: Metals including alloys, all forms, tantalum value, thousands	$9	$4	--	Austria $1; Switzerland $1; United Kingdom $1.
Copper:				
Ore and concentrate	9,934	53,626	7,709	Norway 24,942; Morocco 6,014; Mexico 4,954.
Matte and speiss including cement copper	1	1	--	All from Switzerland.
Oxides and hydroxides	165	245	--	Australia 198; West Germany 36.
Sulfate	1,620	2,084	--	West Germany 766; U.S.S.R. 621; Belgium-Luxembourg 280.
Ash and residue containing copper	30	90	--	All from Sweden.
Metal including alloys:				
Scrap	1,768	2,004	1,287	United Kingdom 349; Sweden 181; Czechoslovakia 67.
Unwrought	23,933	20,420	--	Zambia 7,633; U.S.S.R. 4,888; West Germany 2,351.
Semimanufactures	13,717	15,024	90	Sweden 6,735; West Germany 4,096; Poland 1,605.
Gold: Metal including alloys, unwrought and partly wrought, troy ounces	30,672	28,743	161	United Kingdom 16,719; Sweden 5,305; West Germany 4,115.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite, thousand tons	1,737	1,495	--	Sweden 1,017; U.S.S.R. 276; Norway 196.
Metal:				
Scrap	104,581	62,095	126	U.S.S.R. 49,433; United Kingdom 11,455.
Pig iron, cast iron, related materials	45,698	25,114	(1)	Sweden 13,540; West Germany 4,936; Republic of South Africa 2,032.
Ferroalloys:				
Ferromanganese	3,881	3,606	--	Norway 3,287; West Germany 98; Sweden 93.
Ferromolybdenum	375	287	5	Austria 83; Belgium-Luxembourg 65; Sweden 45.
Ferrosilicomanganese	17,148	13,873	--	Norway 8,423; U.S.S.R. 4,940; Czechoslovakia 399.
Ferrosilicon	10,125	9,195	--	Norway 6,205; U.S.S.R. 2,569; Sweden 152.
Unspecified	16,786	10,178	1	Greece 2,512; Norway 1,404; Sweden 682.
Steel, primary forms	9,589	5,424	--	Netherlands 4,745; West Germany 364; Sweden 279.
Semimanufactures:				
Bars, rods, angles, shapes, sections	225,280	249,321	67	Sweden 74,209; West Germany 38,676; Czechoslovakia 25,528.
Universals, plates, sheets	176,014	183,962	644	West Germany 64,579; Czechoslovakia 22,319; Sweden 21,483.
Hoop and strip	30,371	28,662	15	Sweden 9,547; West Germany 7,840; United Kingdom 2,340.
Rails and accessories	3,405	4,845	(1)	West Germany 2,405; Sweden 1,351; Belgium-Luxembourg 603.
Wire	19,978	20,316	136	Sweden 7,196; Belgium-Luxembourg 4,574; West Germany 3,383.
Tubes, pipes, fittings	123,913	128,725	314	West Germany 44,053; United Kingdom 14,995; France 10,010.
Castings and forgings, rough	2,200	3,053	(1)	West Germany 840; Sweden 629; Switzerland 452.

See footnotes at end of table.

Table 3.—Finland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	--	1,053	1,053	
Oxides	212	67	--	East Germany 18; Sweden 18; West Germany 16.
Metal including alloys:				
Scrap	597	155	--	All from Norway.
Unwrought	20,498	21,422	475	Sweden 7,337; U.S.S.R. 7,000; United Kingdom 2,737.
Semimanufactures	832	635	--	West Germany 390; Belgium-Luxembourg 218; Sweden 12.
Magnesium: Metal including alloys:				
Unwrought	180	59	17	Norway 42.
Semimanufactures	16	777	3	Norway 726; West Germany 48.
Manganese:				
Ore and concentrate:				
Metallurgical-grade	10,736	337	--	China 321; Belgium-Luxembourg 15.
Oxides	767	739	(1)	Netherlands 318; China 192; Belgium-Luxembourg 132.
Mercury 76-pound flasks	116	116	--	Spain 87.
Metalloids:				
Arsenic, oxides and acids	1,220	1,644	--	Sweden 1,594; China 50.
Phosphorous	11	5	(1)	United Kingdom 3; West Germany 1.
Silicon	471	687	--	Sweden 380; Norway 301.
Unspecified	11	36	--	Sweden 21; Japan 10; West Germany 4.
Molybdenum:				
Ore and concentrate	675	454	251	Canada 109; Sweden 46; Belgium-Luxembourg 38.
Metal including alloys, all forms	5	4	1	Austria 1; West Germany 1.
Nickel:				
Ore and concentrate	14,676	12,402	--	Norway 12,185; French Polynesia 217.
Matte and speiss	7,523	6,271	112	Canada 4,992; Australia 1,060.
Metal including alloys:				
Scrap	1,944	1,449	466	United Kingdom 439; West Germany 264; Netherlands 181.
Unwrought	4,299	2,460	56	U.S.S.R. 1,912; Hungary 254; Canada 149.
Semimanufactures	97	106	18	West Germany 32; U.S.S.R. 11; Sweden 10.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified troy, ounces	5,884	1,800	(1)	United Kingdom 997; Sweden 450; West Germany 193.
Silver:				
Ore and concentrate[2] value, thousands	$23	$30	--	All from Sweden.
Waste and sweepings[2] do.	$2,379	$120	$45	Spain $44; West Germany $15; United Kingdom $9.
Metal including alloys, unwrought and partly wrought thousand troy ounces	3,601	2,990	(1)	West Germany 1,447; United Kingdom 1,254.
Tin: Metal including alloys:				
Scrap	--	(1)	--	All from West Germany.
Unwrought	267	191	--	Malaysia 67; Netherlands 33; West Germany 30.
Semimanufactures	112	123	(1)	United Kingdom 78; West Germany 24; Belgium-Luxembourg 8.
Titanium:				
Ore and concentrate	37,602	10,735	--	Norway 10,450; Netherlands 160; India 101.
Oxides	348	283	7	West Germany 219; Belgium-Luxembourg 46.
Tungsten: Metal including alloys, all forms	83	27	10	West Germany 7; Denmark 5; Belgium-Luxembourg 2.
Vanadium: Oxides and hydroxides	(1)	59	59	

See footnotes at end of table.

Table 3.—Finland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	189,500	135,547	--	Greenland 81,358; Sweden 41,994; Ireland 12,195.
Oxides	382	475	--	Sweden 191; West Germany 116; Netherlands 72.
Blue powder	672	801	--	Norway 620; West Germany 152; Sweden 20.
Ash and residue containing zinc	33	1,551	36	West Germany 1,049; Norway 255; Sweden 211.
Metal including alloys:				
Scrap	--	62	--	West Germany 42; Norway 20.
Unwrought	1,085	453	19	West Germany 201; Netherlands 162; Italy 39.
Semimanufactures	r167	118	--	France 30; Norway 30; West Germany 29.
Zirconium: Ore and concentrate	23	60	--	United Kingdom 58.
Other:				
Ores and concentrates	25	57	--	All from Sweden.
Oxides and hydroxides	484	550	19	West Germany 184; United Kingdom 117; China 101.
Ashes and residues	2,883	2,138	1,960	United Kingdom 127; France 51.
Pyrophoric alloys	1	10	1	Italy 9.
Cermets	23	18	--	Denmark 10; Austria 5; Sweden 2.
Base metals including alloys, all forms	178	180	12	Republic of South Africa 43; West Germany 34; United Kingdom 34.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	87	70	2	Italy 42; Netherlands 14; West Germany 10.
Artificial:				
Corundum	839	1,123	17	Austria 917; West Germany 90; United Kingdom 78.
Silicon carbide	762	591	--	Norway 571.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$24	$22	--	U.S.S.R. $15; West Germany $3.
Grinding and polishing wheels and stones	2,460	2,597	441	Austria 555; West Germany 499; Sweden 232.
Asbestos, crude	5,040	3,573	6	Canada 1,366; Republic of South Africa 1,207; U.S.S.R. 639.
Barite and witherite	1,168	1,545	--	West Germany 1,239; United Kingdom 115; China 103.
Boron materials:				
Crude natural borates	17,809	21,337	13,264	Turkey 7,500; West Germany 553.
Oxides and acids	192	677	68	U.S.S.R. 350; Turkey 140; France 93.
Cement	8,575	8,545	5	Denmark 3,895; West Germany 2,830; United Kingdom 1,270.
Chalk	12,454	18,033	1	Denmark 8,671; West Germany 5,916; Sweden 2,204.
Clays and clay products:				
Crude:				
Fire clay	15,345	12,933	--	United Kingdom 8,677; West Germany 3,361; France 800.
Kaolin	390,021	365,051	1,787	United Kingdom 339,019; Brazil 5,500; France 5,335.
Unspecified	10,958	19,063	6,037	West Germany 4,580; United Kingdom 3,372; Cyprus 2,550.
Products:				
Nonrefractory	38,808	30,196	(1)	U.S.S.R. 13,536; Italy 4,174; West Germany 2,243.
Refractory including nonclay brick	63,783	56,508	147	United Kingdom 11,280; West Germany 10,692; Sweden 10,690.
Cryolite and chiolite	77	46	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$10,201	$9,328	$177	Belgium-Luxembourg $4,043; Israel $2,733; United Kingdom $942.
Industrial ---do---	$105	$75	$4	Belgium-Luxembourg $44; Republic of South Africa $20.
Diatomite and other infusorial earth	2,053	2,184	659	Iceland 588; United Kingdom 429; Switzerland 203.

See footnotes at end of table.

Table 3.—Finland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Feldspar, fluorspar, related materials:				
Fluorspar	4,429	4,104	--	Netherlands 1,909; Thailand 725; Mexico 660.
Unspecified	701	49	--	West Germany 17.
Fertilizer materials:				
Crude, n.e.s	--	27	--	All from United Kingdom.
Manufactured:				
Ammonia	265,419	288,531	44,500	U.S.S.R. 167,120; United Kingdom 39,873; France 23,949.
Nitrogenous	35,113	26,601	(1)	U.S.S.R. 9,036; Norway 8,457; Sweden 5,517.
Phosphatic	12,681	323	--	Belgium-Luxembourg 256; United Kingdom 40.
Potassic	333,528	298,150	--	East Germany 110,237; U.S.S.R. 97,410; West Germany 34,962.
Unspecified and mixed	32,652	29,856	28,660	Belgium-Luxembourg 656; Sweden 285; United Kingdom 201.
Graphite, natural	172	2,268	--	Sweden 2,169; West Germany 41; Norway 34.
Gypsum and plaster	151,201	139,662	17	Spain 109,219; U.S.S.R. 21,428; Sweden 4,397.
Halogens:				
Chlorine	(1)	1,386	--	Sweden 1,379.
Unspecified	4	6	--	Switzerland 5.
Lime	424	1,246	--	West Germany 762; Denmark 219; United Kingdom 219.
Magnesium compounds: Other	15,865	16,775	72	China 6,860; U.S.S.R. 5,180; Spain 2,778.
Mica:				
Crude including splittings and waste	253	177	2	United Kingdom 127; India 30; Norway 12.
Worked including agglomerated splittings	29	29	(1)	Austria 13; Switzerland 7; West Germany 4.
Phosphates, crude	613,628	410,232	62,707	Senegal 123,762; Morocco 110,466; Algeria 85,870.
Pigments, mineral: Iron oxides and hydroxides, processed	4,275	4,116	28	West Germany 3,883; Denmark 44; Netherlands 40.
Potassium salts, crude	--	6	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$463	$336	$7	West Germany $113; Switzerland $69; Sweden $52.
Synthetic do	$494	$397	$182	Switzerland $99; Austria $74; West Germany $16.
Pyrite, unroasted	556	22	--	Italy 13; West Germany 6; Norway 3.
Salt and brine	726,593	721,283	2	Netherlands 399,874; Poland 90,989; West Germany 56,842.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	774	435	--	Sweden 158; West Germany 146; France 54.
Sodium carbonate, natural and manufactured	88,285	88,245	--	East Germany 27,066; U.S.S.R. 18,419; United Kingdom 15,616.
Sodium hydroxide	70,772	107,163	--	West Germany 56,220; East Germany 19,877; Netherlands 9,476.
Sodium sulfate, natural and manufactured	32,418	24,464	--	Sweden 16,974; Belgium-Luxembourg 6,693; East Germany 783.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,415	3,478	73	Italy 2,952; Norway 240; Sweden 124.
Worked	379	442	4	Italy 234; Sweden 149; Norway 39.
Dolomite, chiefly refractory-grade	17,511	13,584	--	Belgium-Luxembourg 9,080; Norway 2,634; West Germany 1,763.
Gravel and crushed rock	6,005	10,496	472	Sweden 8,374; Norway 546; West Germany 429.
Limestone other than dimension	735,157	600,950	--	Sweden 585,590; Denmark 6,104; United Kingdom 5,751.
Quartz and quartzite	185	143	17	Sweden 35; West Germany 21; Norway 21.
Sand other than metal-bearing	71,562	54,095	1	Belgium-Luxembourg 36,872; Denmark 9,550; Norway 5,569.

See footnotes at end of table.

Table 3.—Finland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and by-product	58,357	52,824	2	Poland 38,316; France 10,743; West Germany 2,718.
Colloidal, precipitated, sublimed	16	19	--	Belgium-Luxembourg 17; Sweden 1.
Dioxide	5,528	12,780	--	All from Sweden.
Sulfuric acid	91,522	80,398	--	West Germany 23,945; Norway 23,499; Poland 22,180.
Talc, steatite, soapstone, pyrophyllite	805	573	(1)	Belgium-Luxembourg 329; Norway 56; West Germany 54.
Other:				
Crude	59,321	62,843	226	Norway 60,778; Sweden 1,131; Republic of South Africa 210.
Slag and dross, not metal-bearing	75,608	101,224	--	Sweden 58,433; East Germany 38,689; Norway 3,587.
Oxides and hydroxides of barium, magnesium, strontium	2,821	793	37	East Germany 644; China 50; Netherlands 40.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	8,550	7,599	21	Sweden 1,640; Denmark 1,463; U.S.S.R. 1,382.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	405	395	77	Trinidad and Tobago 242; Sweden 35; Italy 20.
Carbon: Carbon black	10,134	8,210	144	Sweden 3,503; Netherlands 2,612; United Kingdom 1,101.
Coal:				
Anthracite	127,242	111,832	2,863	U.S.S.R. 97,534; Republic of South Africa 10,643.
Bituminous thousand tons	4,542	5,538	2,264	Poland 1,421; United Kingdom 1,138; U.S.S.R. 709.
Coke and semicoke do.	1,229	1,114	--	U.S.S.R. 715; Sweden 220; United Kingdom 67.
Gas, natural million cubic feet	31,944	28,487	--	All from U.S.S.R.
Hydrogen, helium, rare gases	2,777	2,486	1	U.S.S.R. 2,320; West Germany 112; Sweden 39.
Peat including briquets and litter	1,967	5,666	--	U.S.S.R. 5,644; Sweden 16.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	109,368	79,164	--	U.S.S.R. 53,991; Saudi Arabia 17,362; Iran 3,696.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	102,379	67,361	--	U.S.S.R. 66,619; France 348; Netherlands 302.
Gasoline do.	135,503	104,559	17	Netherlands 57,452; West Germany 21,352; U.S.S.R. 18,505.
Mineral jelly and wax do.	151,301	86,664	55	West Germany 40,680; U.S.S.R. 17,489; United Kingdom 10,475.
Kerosine and jet fuel do.	46,663	41,687	39	United Kingdom 31,806; U.S.S.R. 6,626; Netherlands 2,209.
Distillate fuel oil thousand 42-gallon barrels	10,375	7,802	8	U.S.S.R. 7,794.
Lubricants do.	969	783	29	United Kingdom 165; France 132; U.S.S.R. 130.
Residual fuel oil do.	8,876	9,947	--	U.S.S.R. 9,900; Belgium-Luxembourg 40; France 6.
Bitumen and other residues 42-gallon barrels	405,166	311,102	--	Sweden 141,568; Denmark 137,150; Netherlands 26,385.
Bituminous mixtures do.	24,337	14,241	1,721	Sweden 8,036; United Kingdom 1,145; West Germany 1,018.
Petroleum coke do.	r88,066	83,540	82,192	West Germany 721; United Kingdom 627.
Tars and other crude chemicals derived from coal, gas, and petroleum	23,797	32,734	21	West Germany 17,756; Poland 10,547; U.S.S.R. 1,659.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.

COMMODITY REVIEW

METALS

Cobalt.—Construction continued at Outokumpu's cobalt salt plant for a startup at the beginning of 1983, when Outokumpu was to convert some of its cobalt production to cobalt salts; about 1,800 tons of cobalt and nickel salts will be produced. The salts were to be exported to Western Europe, mainly the United Kingdom and the Federal Republic of Germany. In 1981, Outokumpu produced about 6% of the world's cobalt.

Chromium.—Work continued to extend Outokumpu's stainless steelworks. When completed, capacity of the plant will increase 15% to about 90,000 tons per year.

Extraction of ore at the Evijärvi and Viia open pits at Outokumpu's Kemi Mine was cut back because of reduced demand. The Tornio ferrochrome plant, which uses part of Kemi ores, ran at full capacity. The stainless steel plant used nearly two-thirds of the ferrochrome. Both plants set new records for increased production.

Copper.—The development of the Laurinoja copper-bearing iron ore deposit at the Government-owned Rautaruukki Oy's Rautavaara Mine was completed and mining was started as an open-cast operation. The new flotation plant began operations and 4,300 tons of copper concentrates were produced.

Outokumpu completed a modernization program at its Harjavalta east coast copper smelter. As a result, the converter department now has a capacity of 80,000 tons per year.

In 1982, Outokumpu's Keretti, Vuonos, Hammaslahti, Vihanti, Kotalahti, Virtasalmi and Pyhasalmi Mines, all located in the southern half of the country, produced copper concentrates and accounted for virtually the entire domestic output.

Nickel.—Outokumpu plans to close on a temporary basis for the next 1 or 2 years, its Hitura nickel mine and concentrator, as production cost has exceeded the current sales price. In 1982, the mine produced 1,460 tons of nickel in ore. Hitura had provided about 20% of the feedstock supplying the Harjavalta nickel smelter; the capacity of the latter has recently been expanded from 15,000 tons to 16,000 tons per year. Outokumpu produced about 50% of its nickel requirement from ore; the rest was imported.

Outokumpu's Vammala, Kotalahti, and Vuonos Mines produced all its nickel concentrates. In addition, Yht. Paperitethat Oy produced some nickel concentrates at Lahnaslampi, as did Malmikaivos Oy at Repovaara.

Vanadium.—Europe's vanadium output is to drop sharply in 1983, when Government-owned Rautaruukki closes its Mustavaara Mine in north-central Finland because of a drop in the price of vanadium. Rautaruukki's share of world vanadium production has been about 8% but could drop to about 3%. Rautaruukki's other vanadium mine at Otanmäki, central Finland, which produces vanadium, iron, and ilmenite concentrates, will remain in operation.

NONMETALS

Apatite.—Government-owned Kemira has completed the expansion of its phosphoric acid plant at Siilinjärvi, central Finland; capacity was increased from 120,000 to 180,000 tons per year of phosphorus pentoxide (P_2O_5). Expansion of the adjacent apatite mine and that of the sulfuric acid plant has also been completed. Products of the plant are a 30% P_2O_5 phosphoric acid and a gypsum byproduct that is discharged to waste. The mine and the $60 million plant have made Finland self-sufficient in phosphates.

Titanium.—Kemira, Finland's only titanium dioxide producer, has invested about $1.5 million in waste treatment facilities since 1978, when authorities of the Water Court of West Finland decided the company had to reduce ferrous sulfate emissions from its Pori plant into Pihlavalahnti Bay. The 80,000-ton-per-year sulfate-route plant uses domestic ilmenite and acid from a 250,000-ton-per-year captive onsite elemental sulfur plant.

Wollastonite.—Oy Partek has built a second flotation plant for wollastonite near the site of its existing plant at Lappeenranta, doubling capacity to 40,000 tons per year. The plant is now the only one in Europe and the second largest in the world. In the past, hand-sorting of wollastonite was used, but optical sorters are now employed for treating a concentrate from which calcite has previously been removed by flotation.

MINERAL FUELS

Finland remained about 85% dependent on imported fuels, mostly oil, natural gas, and coal; much of the oil and all natural gas being imported from the U.S.S.R. Domestic fuels were hydroelectric power, peat, fuelwood, and waste.

Table 4.—Finland: Supply and apparent consumption of fuels and power

(Million tons of standard coal equivalent)

	Total primary energy	Coal and coke	Natural gas	Petroleum and refinery products	Fuelwood and waste[e]	Peat	Hydroelectric power	Nuclear power[1]
1981:								
Production[2]	4.3	--	--	--	2.1	0.6	1.6	--
Imports	28.6	6.5	0.9	19.2	--	--	.2	1.8
Exports	1.8	--	--	1.8	--	--	--	--
Apparent consumption	31.1	6.5	.9	17.4	2.1	.6	1.8	1.8
1982:[p]								
Production[2]	4.4	--	--	--	2.1	.7	1.6	--
Imports	27.8	6.5	.9	18.2	--	--	.2	2.0
Exports	1.8	--	--	1.8	--	--	--	--
Apparent consumption	30.4	6.5	.9	16.4	2.1	.7	1.8	2.0

[e]Estimated. [p]Preliminary.
[1]Thermal burnoff of imported uranium fuel.
[2]Primary energy only.

Sources: Bulletin of Statistics, Foreign trade, Central Statistics Office of Finland, Helsinki.

Coal.—A consortium of four Finnish state-owned companies, Imatran Voima Oy, Neste Oy, Outokumpu, and Rautaruukki started an investigation of coal deposits in Spitsbergen, Norway, with the goal of producing 1 million tons per year.

Natural Gas.—Natural gas came from the U.S.S.R. by a 28-inch pipeline extending 125 kilometers from the border to Kouvola. Conservation measures have lowered consumption below the 1-billion-cubic-meter-per-year import quota. There were negotiations between the Finnish and Swedish Governments to extend the pipeline through Finland to Sweden across the Baltic Sea, making a supply network through Finland a mutual Swedish-Finnish project.

Nuclear Power.—In 1982, Finland had four nuclear powerplants: Loviisa 1 and 2 of 440 megawatts each, operated by Imatran Voima, about 80 kilometers east of Helsinki; and Tellisuuden Voima Oy's Olkiluoto 1 and 2 of 660 megawatts each, located on the west coast. Earlier plans to build a 1,000-megawatt nuclear powerplant near Helsinki have now been postponed indefinitely.

Peat.—In 1982, total thermal output of all peat-fired powerplants was about 2,430 megawatts from about 100 units.

Petroleum.—Government-owned Neste signed a contract with the State Oil Co. of the German Democratic Republic to refine 1,400,000 barrels of East German crude oil. This represented only about 2% of Neste's entire refinery operation, which was about 70 million barrels of product, or two-thirds of capacity. The country's only two refineries were located on the southwest coast at Naantali, and 50 kilometers east of Helsinki at Porvoo. Most crude oil was imported from the U.S.S.R. as part of a barter agreement. Of late, Finland has decreased its use of oil, tilting the U.S.S.R.-Finnish trade balance heavily in favor of Finland.

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[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Finnish markka (Fmk) to U.S. dollars at the rate of Fmk4.315=US$1.00 in 1982.

The Mineral Industry of France

By Roman V. Sondermayer[1]

France, which extracted small quantities and had sizable imports of minerals, remained among the major processors of minerals and crude petroleum in Europe. However, reflecting the general slackening of the French economy, activities of the mineral industry were slower than in previous years. The mineral industry of France was an important sector of the economy. In some areas of the country, it was the sole employer, and in 1982, some mining operations in France were kept in operation for social reasons.

The most prominent minerals and metals produced in France, with production expressed as approximate percentages of the world totals, were arsenic, 13%; gypsum, 9%; potash, 7%; fluorspar, 6%; feldspar, 6%; ferroalloys, 5%; cadmium metal, 4%; magnesium metal, 4%; sulfur, 4%; talc, 4%, alumina, 3%; aluminum, 3%; steel, 3%; and petroleum refinery products, 3%.

Based on French Government figures,[2] the share of the mineral and processing industry in the gross domestic product (produit interieur brut) was around 11% in 1981, the latest year for which complete data were available.

After nationalization of most large industry in 1981-82, the Government of France was implementing various plans for restructuring the mineral industry, including processing. At yearend, many problems persisted and the restructuring of the industry was only partially complete. Almost all of the newly nationalized mineral producing and processing organizations showed significant losses; many requested large amounts of financial assistance for operation, modernization, and restructuring.

The Government, in an effort to revitalize the French mineral industry and ensure supply of raw materials, took a strong stand against monopolism and protectionism in foreign trade; the Government also intended to use its scientific and technologic knowhow and its political influence to ensure minerals supply.

With the formulation of its National Energy Plan (NEP) for 1981-90, the Socialist Government juggled the details of the former national energy consumption mix, notably by stressing conservation efforts, by promoting renewable energy sources to a slightly greater extent, and by emphasizing goals for increased domestic coal production.

The aims of the NEP, to be reached by 1990, were reported as follows:

1. The Government hopes to import only 30% of its total energy needs compared with about 75% in recent years.

2. Nuclear energy will provide the electricity baseload, and its consumption is expected to increase from 20 million to 60 million to 65 million tons of oil equivalent.

3. Total oil consumption was targeted at 70 million to 75 million tons of oil equivalent compared with 87 million tons in 1981.

4. Investments for energy-saving methods and technologies were planned at $5 billion to $6 billion[3] annually during the eighties. Conservation should result in savings of 60 million tons of oil equivalent annually compared with only 20 million tons in 1981.

In 1982, the French Government decided to restructure the collection and dissemination of mineral statistics. A new organization named Observatoire des Matieres Premieres was formed as part of the Ministry of Industry; it incorporated functions of the Bureau de Documentation Minière.

Principal events in the mineral industry

during 1982 included development of a new bauxite mine near Toulon, the end of cobalt metal production, the start of production in two tungsten mines, delineation of the uranium deposit in Gironde, and shutdown of capacity for processing of 126 million barrels per year of crude oil.

PRODUCTION

Large mineral producing and processing companies were Government-controlled operations. Bureau de Récherches Géologiques et Minières (BRGM) remained an important instrument of the French Government in securing raw materials for the French industry.

Table 1.—France: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Bauxite, gross weight ____ thousand tons	1,978	1,970	1,921	1,827	1,690
Alumina:					
Crude ____ do	1,221	1,238	1,339	1,236	1,087
Calcined ____ do	1,056	1,069	1,173	1,095	960
Metal:					
Primary ____ do	391	395	432	436	390
Secondary ____ do	155	161	170	156	154
Antimony:					
Mine output, metal content	--	--	--	312	308
Metal, smelter	5,205	4,000	3,885	5,223	5,867
Arsenic, white[e]	5,950	5,550	5,300	5,200	6,000
Bismuth:[3]					
Ore and concentrate, metal content kilograms	90,000	45,000	48,000	NA	NA
Metal ____ do	(4)	(4)	--	--	--
Cadmium metal	694	689	789	663	793
Cobalt metal including powder	905	771	676	447	e500
Copper:					
Mine output, metal content	r175	r97	r116	98	e90
Metal:					
Blister, secondary	3,200	5,000	7,300	6,500	8,100
Refined:					
Primary	20,672	22,000	23,000	23,000	22,000
Secondary	20,628	23,350	23,500	23,000	24,000
Total	41,300	45,350	46,500	46,000	46,000
Gold, mine output, metal content ____ troy ounces	59,640	54,109	37,391	36,362	e37,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight ____ thousand tons	33,454	31,627	r28,981	21,598	19,391
Metal content ____ do	10,310	9,800	9,100	6,800	6,186
Metal:					
Pig iron ____ do	18,497	19,415	19,159	17,268	15,031
Ferroalloys:					
Blast furnace: Spiegeleisen and ferromanganese ____ do	397	449	480	313	333
Electric-furnace:					
Ferromanganese ____ do	19	13	r21	10	e11
Ferrosilicon ____ do	199	272	r246	189	169
Silicon metal ____ do	42	55	60	60	e55
Ferrochrome ____ do	93	95	r45	27	12
Other ____ do	130	r136	123	115	101
Total[5] ____ do	880	r1,020	r975	714	681
Steel ingots and castings ____ do	22,841	23,360	23,176	21,258	18,416
Semimanufactures ____ do	22,841	23,360	20,998	18,780	16,431
Lead:					
Mine output, metal content	32,500	29,270	28,360	17,200	5,859
Smelter, primary only	125,900	129,100	126,800	128,600	122,700
Refined:[6]					
Primary: Soft lead	125,900	129,100	126,800	128,600	122,700
Secondary:					
Soft lead	19,500	24,800	30,912	35,319	22,400

See footnotes at end of table.

Table 1.—France: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
METALS —Continued					
Lead —Continued					
Refined[6] —Continued					
Secondary —Continued					
Lead content of antimonial lead	62,800	65,800	61,089	64,119	63,500
Total	208,200	219,700	218,801	228,038	208,600
Magnesium metal including secondary	8,500	9,040	9,328	7,263	9,610
Nickel metal, Ni content of metallurgical products (pure nickel, ferronickel, nickel oxide)	7,750	3,320	r7,794	10,051	e10,000
Silver:					
Mine output, metal content thousand troy ounces	2,755	2,408	2,427	1,701	e1,500
Metal, Ag content of final smelter products do	6,665	7,428	r7,794	9,729	e9,500
Tin, smelter output of solder and other alloys, secondary	9,000	9,410	8,900	7,438	6,141
Tungsten concentrate, metal content	608	590	577	591	e600
Uranium:					
Mine output, metal content	2,574	2,771	3,172	2,550	e2,400
Chemical concentrate, U_3O_8 equivalent	2,921	3,332	2,845	2,554	e2,500
Zinc:					
Mine output, metal content	39,860	37,000	35,810	37,429	37,021
Metal including secondary:					
Slab	231,212	248,620	252,800	257,130	243,800
Dust	8,210	8,790	8,390	9,250	e9,000
NONMETALS					
Barite	225,000	170,000	236,560	190,150	143,324
Bromine, elemental	16,200	19,000	16,480	e16,500	e29,000
Cement, hydraulic thousand tons	28,025	28,825	29,104	28,229	26,150
Clays:					
Bentonite[e 7]	8,000	9,000	10,000	10,000	11,000
Kaolin and kaolinitic clay (marketable) thousand tons	265	315	338	331	300
Refractory clay, unspecified do	r1,526	1,560	1,601	1,457	e330
Diatomite do	200	200	220	210	e200
Feldspar, crude do	211	195	210	191	e180
Fluorspar:					
Crude do	535	506	529	524	e520
Marketable, all grades do	274	259	r259	256	e252
Gypsum and anhydrite, crude do	6,071	6,127	r6,491	6,204	e6,200
Kyanite, andalusite, related materials	30,000	e30,000	30,000	30,000	e30,000
Lime: Quicklime, hydrated lime, and dead-burned dolomite thousand tons	r3,728	3,870	r3,610	3,366	e2,300
Mica[e]	7,300	7,000	7,000	7,000	e6,500
Nitrogen: N content of ammonia thousand tons	2,020	2,150	e2,085	2,250	e1,900
Pigments, mineral, natural: Iron oxides	e16,000	e16,500	e16,000	15,000	e14,000
Phosphates:					
Phosphate rock (phosphatic chalk)	24,580	12,420	14,460	12,340	e13,000
Thomas slag thousand tons	2,042	2,072	1,865	1,800	NA
Potash:					
Gross weight (run-of-mine) do	11,666	12,514	12,117	11,344	10,904
K_2O equivalent (run-of-mine) do	1,928	2,075	2,039	1,969	1,824
K_2O equivalent (marketable) do	1,795	r1,921	1,894	1,831	1,704
Pozzolan and lapilli do	653	559	465	450	NA
Salt:					
Rock salt do	458	572	301	298	382
Brine salt (refined) do	1,102	1,188	1,113	1,092	1,071
Marine salt do	864	1,802	1,275	e1,300	1,539
Salt in solution do	3,859	4,495	4,415	3,870	3,711
Total do	6,283	8,057	7,104	6,560	6,703
Sodium compounds:					
Sodium sulfate do	125	152	150	e150	e150
Sodium carbonate do	1,353	1,550	r1,560	e1,600	e1,000
Stone, sand and gravel:					
Limestone, agricultural and industrial:					
For iron and steel manufacture do	2,819	3,087	3,215	5,497	NA
For sugar mills do	975	957	1,003	NA	NA
Other uses do	2,701	2,562	2,385	NA	NA
Total do	6,495	6,606	6,603	NA	NA
Roadbuilding, foundation, and ballast material excluding alluvial sand and gravel:					
Ballast and road surfacing do	18,230	21,720	24,600	NA	NA
Other do	62,000	65,720	69,150	NA	NA
Slate, roof do	86	86	r95	88	NA

See footnotes at end of table.

Table 1.—France: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Stone, sand and gravel —Continued					
Sand and gravel:					
Industrial sands ____ thousand tons	6,385	6,327	6,604	6,046	NA
Other sand and gravel:					
Alluvial ____ do	r206,410	r207,990	215,280	218,300	NA
Product of grinding and crushing ____ do	19,850	20,060	20,060	19,950	NA
Sulfur, byproduct:					
Of natural gas ____ do	1,856	r1,940	1,838	1,701	1,800
Of petroleum ____ do	161	r188	226	221	
Of unspecified sources[e] ____ do	160	160	150	120	110
Total ____ do	2,177	r2,288	2,214	2,042	1,910
Talc:					
Crude	270,820	268,350	320,790	313,140	e310,000
Powder	292,700	302,470	301,580	309,270	e305,000
MINERAL FUELS AND RELATED MATERIALS					
Asphaltic material[8]	68,990	51,420	50,460	54,020	NA
Carbon black[e]	170,000	180,000	170,000	170,000	NA
Coal including briquets:					
Anthracite ____ thousand tons	3,871	3,020	9 18,136	9 18,588	9 16,896
Bituminous coal ____ do	15,819	15,597			
Lignite ____ do	2,732	2,454	2,558	2,945	3,060
Total ____ do	22,422	21,071	20,694	21,533	19,956
Briquets ____ do	2,175	2,134	1,757	1,596	1,320
Coke, metallurgical ____ do	10,682	11,615	11,118	10,723	9,935
Gas, natural:					
Gross ____ million cubic feet	398,517	392,499	382,820	358,936	369,054
Marketed ____ do	277,741	273,687	265,922	249,900	258,321
Natural gas liquids:					
Natural gasoline and condensate ____ thousand 42-gallon barrels	4,194	3,981	NA	4,199	3,851
Propane ____ do	1,751	1,669	NA	1,461	1,658
Butane ____ do	1,804	1,790	NA	1,786	1,430
Total ____ do	7,749	7,440	7,394	7,446	6,939
Peat[e] ____ thousand tons	140	140	140	130	120
Petroleum and refinery products:					
Crude ____ thousand 42-gallon barrels	r8,190	r8,775	r10,375	12,288	12,011
Refinery products:					
Gasoline:					
Aviation ____ do	436	348	264	223	560
Motor ____ do	153,842	161,670	157,485	151,657	142,706
Jet fuel ____ do	32,832	35,192	36,667	35,152	32,392
Kerosine ____ do	705	884	1,054	1,449	938
Distillate fuel oil ____ do	302,436	326,710	267,655	242,293	212,580
Residual fuel oil ____ do	239,820	246,540	215,723	176,244	128,771
Lubricants ____ do	10,276	10,427	10,860	9,279	8,895
Liquefied petroleum gas ____ do	33,860	33,489	36,048	31,320	29,626
Bitumen ____ do	19,956	20,150	19,453	17,853	7,491
Unspecified ____ do	82,755	e87,950	e79,250	9,608	12,576
Refinery fuel and losses ____ do	50,771	54,691	56,832	45,312	40,064
Total ____ do	927,689	978,051	881,291	720,390	616,599

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Oct. 5, 1983.

[2]In addition to the commodities listed, France also produces germanium from domestic ores and has been described as the world's leading producer of this commodity in French sources. Output was reported as 14 metric tons in 1980, all from the Saint-Salvy Mine. Unfortunately, actual output is not regularly reported, and the ore from this mine is not sufficiently uniform in grade to permit estimates of output based on reported concentrate production. In addition, France produces large quantities of stone but statistics on output are not available for 1978-82.

[3]Although output reported is at the smelter stage of production rather than at the mine stage and thus could include metal contained in ores mined in other countries, it is believed that any such production derived from ores from other countries is not duplicative to any significant extent of mine production reported for other countries.

[4]Revised to zero.

[5]Series revised to include blast furnace ferroalloys and silicon metal, both hitherto counted separately.

[6]Series revised to eliminate a small duplication of counting between secondary soft lead and secondary antimonial lead.

[7]Includes smectic clay.

[8]Excludes bituminous material produced by oil refineries.

[9]Includes anthracite.

TRADE

France remained a net importer of minerals in 1981, the latest year for which complete data were available. Roughly 43% of the total value of imports was in minerals, fuels, and related materials. Fuels topped the list of imports and accounted for 28% of total imports. Mineral exports amounted, by value, to 21% of total country exports.

Table 2.—France: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Cesium and rubidium value	$23,900	$23,923	--	NA.
Lithium:				
Oxides and hydroxides	52	47	--	West Germany 36.
Metal including alloys, all forms value	$6,389	$14,906	--	NA.
Alkaline metals	4	31	--	Indonesia 30.
Alkaline-earth metals	409	377	7	West Germany 156; Yugoslavia 66; Belgium-Luxembourg 57.
Rare-earth metals	34	24	--	West Germany 9; Japan 3.
Aluminum:				
Ore and concentrate	10,768	6,628	--	United Kingdom 2,511; West Germany 2,154; Spain 800.
Oxides and hydroxides	346,714	239,000	4,337	Netherlands 70,208; Spain 46,084; Norway 35,419.
Ash and residue containing aluminum	12,147	9,985	--	Italy 6,064; West Germany 2,431; Switzerland 810.
Metal including alloys:				
Scrap	47,219	48,986	32	West Germany 18,303; Italy 15,179; Belgium-Luxembourg 9,644.
Unwrought	177,378	190,462	6,760	Italy 49,569; West Germany 35,226; Belgium-Luxembourg 23,814.
Semimanufactures	237,203	248,356	10,165	West Germany 67,947; United Kingdom 24,147; Italy 22,094.
Antimony:				
Ore and concentrate	104	271	--	Spain 170; Belgium-Luxembourg 100.
Oxides	4,947	6,309	3,518	West Germany 1,194; Netherlands 303; Belgium-Luxembourg 217.
Metal including alloys, all forms	124	77	NA	Belgium-Luxembourg 24; West Germany 14.
Beryllium:				
Oxides and hydroxides	(1)	23	--	NA.
Metal including alloys, all forms value	$102,461	$13,250	NA	NA.
Bismuth: Metal including alloys, all forms	11	8	NA	NA.
Cadmium: Metal including alloys, all forms	265	251	106	Belgium-Luxembourg 103.
Chromium:				
Ore and concentrate	1,616	2,035	--	Spain 1,050; Italy 711; Belgium-Luxembourg 213.
Oxides and hydroxides	533	46	--	West Germany 12; Italy 5; Bulgaria 4.
Metal including alloys, all forms	699	774	327	West Germany 142; Sweden 76; United Kingdom 50.
Cobalt:				
Ore and concentrate	4	1	NA	NA.
Oxides and hydroxides	179	209	(1)	West Germany 48; Romania 34; Italy 25.
Metal including alloys, all forms	831	805	204	West Germany 152; Italy 59; Netherlands 56.
Columbium and tantalum:				
Ash and residue containing columbium and/or tantalum	--	1	--	NA.
Metal including alloys, all forms:				
Columbium (niobium) value	$18,221	$36,437	NA	NA.
Tantalum	20	22	14	United Kingdom 6; West Germany 2.
Copper:				
Ore and concentrate	1,618	801	--	West Germany 748; Belgium-Luxembourg 27; Italy 23.
Matte and speiss including cement copper	2,344	1,860	--	Belgium-Luxembourg 943; Spain 802; West Germany 115.
Oxides and hydroxides	(1)	97	--	Romania 9; unspecified 88.
Sulfate	12,088	6,581	NA	West Germany 3,138; Netherlands 1,123; Ireland 467.
Ash and residue containing copper	16,194	10,500	--	Belgium-Luxembourg 6,563; Spain 1,712; West Germany 1,195.

See footnotes at end of table.

Table 2.—France: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Copper —Continued				
Metal including alloys:				
Scrap	108,369	108,188	65	West Germany 43,728; Belgium-Luxembourg 27,479; Italy 19,019.
Unwrought	19,054	23,535	270	Belgium-Luxembourg 5,477; West Germany 5,141; Sweden 2,927.
Semimanufactures	215,693	251,831	31,000	West Germany 51,959; Italy 38,097; Spain 26,130.
Germanium: Metal including alloys, all forms —value	$261,003	$703,717	--	United Kingdom $478,101; Netherlands $96,062; Belgium-Luxembourg $82,444.
Gold:				
Waste and sweepings value, thousands	$22,415	$19,084	--	Spain $17,935; United Kingdom $758; West Germany $173.
Metal including alloys, unwrought and partly wrought:				
Of domestic origin troy ounces	406,324	145,323	225	West Germany 39,578; United Kingdom 20,962; Brazil 15,979.
Reexports —do	512,873	656,073	289	Switzerland 424,843; United Kingdom 161,205; Belgium-Luxembourg 65,813.
Hafnium: Metal including alloys, all forms —value	$5,206	$6,441	NA	NA.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite thousand tons	8,653	6,378	(1)	Belgium-Luxembourg 5,145; West Germany 1,232.
Metal:				
Scrap —do	3,312	3,184	(1)	Italy 2,276; Spain 640; Belgium-Luxembourg 129.
Pig iron, cast iron, related materials	328,969	241,694	10,002	Italy 76,145; Belgium-Luxembourg 51,090; West Germany 31,811.
Ferroalloys:				
Ferrochromium	1,300	4,742	2,200	Romania 1,000; Italy 596; West Germany 229.
Ferromanganese	321,477	383,596	231,496	Italy 51,907; Belgium-Luxembourg 44,318; West Germany 26,076.
Ferromolybdenum	486	1,115	--	Netherlands 801; West Germany 128; Belgium-Luxembourg 81.
Ferronickel	61,560	48,611	--	West Germany 19,253; Italy 11,561; Sweden 4,092.
Ferrosilicochromium	2,217	2,095	NA	Italy 1,764; Belgium-Luxembourg 306.
Ferrosilicomanganese	9,361	11,507	5,671	West Germany 3,716; Belgium-Luxembourg 1,207; United Kingdom 508.
Ferrosilicon	80,342	70,137	7,014	West Germany 24,630; Italy 15,213; Japan 9,744.
Unspecified	37,055	36,439	6,991	West Germany 6,242; Canada 2,364; United Kingdom 1,997.
Steel, primary forms thousand tons	2,671	3,021	493	Italy 817; Spain 235; West Germany 213.
Semimanufactures:				
Bars, rods, angles, shapes, sections —do	2,844	2,758	257	West Germany 580; Belgium-Luxembourg 328; Italy 263.
Universals, plates, sheets do	3,528	3,314	236	West Germany 627; Italy 413; U.S.S.R. 194.
Hoop and strip	549,471	495,279	4,802	West Germany 164,469; Belgium-Luxembourg 53,691; Italy 48,856.
Rails and accessories	268,348	253,870	31,665	Italy 52,332; Algeria 23,156; Belgium-Luxembourg 23,048.
Wire	185,955	192,575	41,719	West Germany 37,983; United Kingdom 10,875; Belgium-Luxembourg 8,759.
Tubes, pipes, fittings thousand tons	1,521	1,781	184	Iraq 212; Mexico 175; West Germany 135.
Castings and forgings, rough	64,409	64,170	939	West Germany 21,665; Belgium-Luxembourg 20,753; United Kingdom 3,076.

See footnotes at end of table.

Table 2.—France: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	69	140	--	United Kingdom 64; Saudi Arabia 56; Singapore 10.
Oxides	16,368	14,187	1	U.S.S.R. 3,504; Romania 2,340; Czechoslovakia 2,218.
Ash and residue containing lead	13,782	11,824	--	Belgium-Luxembourg 6,817; West Germany 4,782.
Metal including alloys:				
Scrap	7,851	10,635	--	Italy 5,416; West Germany 3,747; Belgium-Luxembourg 790.
Unwrought	57,625	62,188	--	Belgium-Luxembourg 17,038; West Germany 12,835; U.S.S.R. 9,126.
Semimanufactures	3,513	2,033	(1)	West Germany 790; Italy 354; Belgium-Luxembourg 175.
Magnesium: Metal including alloys:				
Scrap	588	568	20	Italy 259; West Germany 200; Netherlands 84.
Unwrought	4,195	5,169	813	West Germany 1,510; Turkey 423; Netherlands 360.
Semimanufactures	184	193	--	West Germany 103; Israel 17; Switzerland 16.
Manganese:				
Ore and concentrate, metallurgical-grade	6,390	17,243	--	Belgium-Luxembourg 11,998; Italy 2,388; Netherlands 1,435.
Oxides and hydroxides	991	777	--	United Kingdom 203; Italy 202; Morocco 107.
Metal including alloys, all forms	2,276	2,987	--	Italy 1,262; Sweden 483; West Germany 334.
Mercury 76-pound flasks	1,102	725	--	Belgium-Luxembourg 522; Austria 58.
Metalloids:				
Arsenic:				
Oxides and acids	7,894	7,903	973	United Kingdom 3,071; Australia 612; Israel 419.
Metal including alloys, all forms	104	87	--	NA.
Boron including alloys, all forms value	$1,626	$35,517	NA	NA.
Phosphorus	1,227	1,552	NA	Switzerland 975; Denmark 40; Belgium-Luxembourg 59.
Selenium	(1)	7	NA	NA.
Silicon	24	20	--	NA.
Tellurium	(1)	5	--	United Kingdom 3.
Molybdenum:				
Ore and concentrate	1,180	1,481	--	Netherlands 888; Austria 246; Belgium-Luxembourg 138.
Oxides and hydroxides	21	1	--	NA.
Metal including alloys:				
Scrap	NA	97	12	West Germany 44; United Kingdom 11; Japan 5.
Unwrought	NA	42	--	Netherlands 26; United Kingdom 7; Sweden 4.
Semimanufactures	88	41	--	West Germany 16; United Kingdom 11.
All forms	45	--		
Nickel:				
Ore and concentrate value	$8,282	--		
Matte and speiss	272	3	--	Portugal 2; Switzerland 1.
Oxides and hydroxides	547	235	37	West Germany 44; Yugoslavia 32; Spain 20.
Ash and residue containing nickel	4,634	1,056	--	Sweden 340; Italy 209; United Kingdom 192.
Metal including alloys:				
Scrap	2,179	2,461	362	West Germany 958; United Kingdom 526; Austria 201.
Unwrought	6,757	5,262	366	West Germany 1,855; India 539; Mexico 500.
Semimanufactures	6,301	4,513	549	West Germany 2,436; Italy 242; Belgium-Luxembourg 144.
Platinum-group metals:				
Waste and sweepings value, thousands	$4,822	$7,023	--	Spain $5,056; United Kingdom $1,537; Switzerland $300.
Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	10,353	21,348	--	Switzerland 10,835; Netherlands 2,765; United Kingdom 2,026.

See footnotes at end of table.

Table 2.—France: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Platinum-group metals —Continued				
Metal including alloys, unwrought and partly wrought —Continued				
Platinum ____ troy ounces	80,072	92,113	--	Switzerland 29,257; United Kingdom 22,666; West Germany 13,407.
Unspecified ____ do	18,099	17,104	NA	West Germany 6,012; Bulgaria 4,373; United Kingdom 2,861.
Rhenium: Metal including alloys, all forms ____ value	$452,674	$46,191	NA	NA.
Silver:				
Ore and concentrate value, thousands	$1,607	$601	--	All to Sweden.
Waste and sweepings ____ do	$56,199	$30,204	--	Spain $24,826; Sweden $4,819; West Germany $324.
Metal including alloys, unwrought and partly wrought thousand troy ounces	30,581	18,717	(1)	United Kingdom 9,619; Switzerland 4,226; Netherlands 1,134.
Tin:				
Ore and concentrate	8	36	--	Spain 35.
Oxides	27	56	NA	West Germany 49; Belgium-Luxembourg 5.
Ash and residue containing tin	180	160	--	West Germany 119; Spain 21.
Metal including alloys:				
Scrap	915	656	--	Netherlands 338; West Germany 172; United Kingdom 116.
Unwrought	643	848	18	United Kingdom 415; Netherlands 319; Italy 25.
Semimanufactures	356	327	1	Nigeria 74; Italy 52; Switzerland 48.
Titanium:				
Ore and concentrate	2,160	1,070	--	West Germany 938.
Oxides	2,502	2,495	--	United Kingdom 748; Italy 565; Belgium-Luxembourg 237.
Metal including alloys:				
Scrap	NA	758	57	United Kingdom 407; West Germany 161; Netherlands 65.
Unwrought	NA	2	NA	NA.
Semimanufactures	250	423	20	Belgium-Luxembourg 178; West Germany 30; United Kingdom 13.
All forms	484	--		
Tungsten:				
Ore and concentrate	846	760	198	West Germany 262; Austria 176; Singapore 72.
Oxides and hydroxides	40	81	--	Sweden 42; Bulgaria 25; Switzerland 5.
Ash and residue containing tungsten	--	66	--	NA.
Metal including alloys:				
Scrap	NA	318	67	West Germany 127; Belgium-Luxembourg 43; Switzerland 38.
Unwrought	NA	75	--	Switzerland 25; West Germany 24; Italy 7.
Semimanufactures	19	43	1	West Germany 10; Belgium-Luxembourg 7; Sweden 5.
All forms	248	--		
Uranium and/or thorium:				
Ore and concentrate	11	--		
Metal including alloys, all forms, uranium	3	4	NA	NA.
Vanadium:				
Oxides and hydroxides	39	50	--	All to Belgium-Luxembourg.
Ash and residue containing vanadium	168	112	--	NA.
Metal including alloys:				
Scrap	NA	53	--	Netherlands 6; unspecified 47.
Unwrought	NA	1	NA	NA.
Semimanufactures ____ value	$21,533	$16,010	NA	NA.
Zinc:				
Ore and concentrate	43,979	50,642	--	Italy 29,982; Belgium-Luxembourg 20,633.
Oxides	19,470	13,830	--	Romania 2,402; West Germany 2,306; Belgium-Luxembourg 1,958.
Blue powder	1,846	2,736	136	West Germany 889; Italy 761; Switzerland 501.
Matte	5,201	2,998	--	Italy 1,656; Belgium-Luxembourg 462; Netherlands 435.

See footnotes at end of table.

Table 2.—France: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc —Continued				
Ash and residue containing zinc	21,012	23,654	--	Belgium-Luxembourg 15,445; West Germany 7,332; Netherlands 777.
Metal including alloys:				
Scrap	3,209	7,861	--	Italy 2,963; Belgium-Luxembourg 2,347; West Germany 1,550.
Unwrought	35,504	61,929	23,352	West Germany 11,853; Belgium-Luxembourg 5,967; Sweden 5,287.
Semimanufactures	42,047	37,792	29	Belgium-Luxembourg 18,018; West Germany 11,801; Denmark 3,210.
Zirconium:				
Ore and concentrate	260	97	NA	West Germany 13; unspecified 84.
Metal including alloys, all forms	888	--		
Other:				
Ores and concentrates	2,521	368	(1)	Algeria 288.
Oxides and hydroxides	1,908	1,077	48	West Germany 294; United Kingdom 115; Belgium-Luxembourg 57.
Ashes and residues	22,407	16,887	--	Sweden 10,862; West Germany 2,065; Belgium-Luxembourg 1,931.
Pyrophoric alloys	13	82	NA	NA.
Cermets	(1)	48	NA	NA.
Base metals including alloys, all forms	5	83	2	Japan 76; United Kingdom 3.
Waste and sweepings of precious and semiprecious metals value, thousands	$2,285	$3,054	--	United Kingdom $1,432; West Germany $1,013; Belgium-Luxembourg $349.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,120	1,165	34	Netherlands 272; West Germany 240; Belgium-Luxembourg 236.
Artificial: Corundum	24,610	21,654	756	Italy 5,069; Austria 2,819; West Germany 2,522.
Dust and powder of precious and semiprecious stones, including diamond kilograms	40	18	NA	NA.
Grinding and polishing wheels and stones	3,949	4,717	97	West Germany 1,092; United Kingdom 784; Spain 342.
Asbestos, crude	1,574	1,334	--	Tunisia 1,147; Spain 46; Guadeloupe 37.
Barite and witherite	98,255	103,858	--	West Germany 82,206; Greece 5,200; Italy 4,209.
Boron materials:				
Crude natural borates	4,583	2,341	--	Spain 1,388; Italy 602; Belgium-Luxembourg 259.
Oxides and acids	40,536	26,570	29	West Germany 8,438; East Germany 5,489; Hungary 2,195.
Cement thousand tons	2,614	2,844	246	Ivory Coast 475; West Germany 366; Cameroon 358.
Chalk	530,633	522,676	5,078	West Germany 205,359; Belgium-Luxembourg 110,147; Switzerland 39,315.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	437	318	--	Netherlands 147.
Bentonite	6,880	12,630	--	Nigeria 4,117; Congo 2,062; Belgium-Luxembourg 1,442.
Chamotte earth	211,174	179,859	--	Italy 65,648; West Germany 34,661; Belgium-Luxembourg 17,500.
Dinas earth	53	26	NA	NA.
Kaolin	181,593	167,284	--	West Germany 73,482; Italy 43,740; Switzerland 11,461.
Unspecified	389,543	347,855	66	Italy 178,491; West Germany 88,530; Spain 16,120.
Products:				
Nonrefractory	422,619	393,243	2,375	West Germany 198,269; Belgium-Luxembourg 73,347; Switzerland 50,013.
Refractory including nonclay brick	216,046	215,748	4,213	West Germany 59,333; Belgium-Luxembourg 29,767; Italy 27,569.
Cryolite and chiolite	12	43	--	Iraq 21; Italy 21.
Diamond:				
Gem, not set or strung carats	54,949	43,091	3,905	Switzerland 15,404; Belgium-Luxembourg 13,348; Israel 2,923.

See footnotes at end of table.

Table 2.—France: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diamond —Continued				
Industrial ____ carats	177,213	155,999	5,497	Ireland 85,961; Belgium-Luxembourg 58,081; United Kingdom 693.
Diatomite and other infusorial earth	25,852	26,978	--	West Germany 8,685; Belgium-Luxembourg 4,614; Italy 2,840.
Feldspar, fluorspar, related materials:				
Feldspar	56,949	58,571	--	Belgium-Luxembourg 25,024; Spain 14,728; West Germany 6,947.
Fluorspar	107,392	84,181	--	West Germany 39,437; Italy 29,181; Sweden 4,354.
Unspecified	136	82	--	NA.
Fertilizer materials:				
Crude, n.e.s	28,694	25,956	--	Switzerland 13,438; Belgium-Luxembourg 2,830; Spain 2,115.
Manufactured:				
Ammonia	159,466	244,117	--	West Germany 98,780; Spain 24,010; Italy 19,059.
Nitrogenous	586,482	661,154	--	Belgium-Luxembourg 111,141; China 84,053; West Germany 79,744.
Phosphatic	254,550	228,121	--	Switzerland 77,650; Austria 43,890; Italy 33,861.
Potassic	335,407	365,959	--	West Germany 83,394; Italy 69,412; Switzerland 54,548.
Unspecified and mixed	513,781	418,521	6	Belgium-Luxembourg 83,073; West Germany 76,895; Ireland 68,743.
Graphite, natural ___ thousand tons	889	810	--	West Germany 376; Spain 153; United Kingdom 87.
Gypsum and plaster ____ do	1,142	1,144	(1)	West Germany 438; Belgium-Luxembourg 350; Netherlands 114.
Halogens:				
Chlorine	9,551	5,189	--	West Germany 3,822; Tunisia 458; Switzerland 365.
Iodine	138	140	NA	West Germany 40; United Kingdom 23; Czechoslovakia 13.
Unspecified	67	2	--	NA.
Lime	240,029	243,095	53	West Germany 133,091; Belgium-Luxembourg 71,433; Guinea 10,321.
Magnesium compounds:				
Magnesite	1,295	1,416	--	West Germany 257; unspecified 1,159.
Oxides and hydroxides	8,216	12,532	--	U.S.S.R. 4,600; Spain 2,206; Italy 1,385.
Mica:				
Crude including splittings and waste	3,816	6,032	22	United Kingdom 2,471; West Germany 995; Belgium-Luxembourg 680.
Worked including agglomerated splittings	840	976	19	West Germany 317; Switzerland 295; Italy 92.
Nitrates, crude	11	1	--	All to Italy.
Phosphates, crude	15,498	3,440	--	Belgium-Luxembourg 3,009; Netherlands 187; Italy 136.
Pigments, mineral:				
Natural, crude	1,262	961	NA	Algeria 250; unspecified 711.
Iron oxides and hydroxides, processed	r8,410	9,794	1,091	Italy 2,035; United Kingdom 770; Belgium-Luxembourg 584.
Potassium salts, crude	13,293	8,807	--	Belgium-Luxembourg 5,985; Switzerland 1,467; Netherlands 1,145.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material value, thousands	$57,587	$53,350	$2,169	Switzerland $42,601; United Kingdom $1,949; Brazil $1,644.
Quartz crystal, piezoelectric do	$51	$132	NA	Switzerland $113.
Synthetic ____ do	$13,538	$12,795	$1	Switzerland $7,191; West Germany $539; U.S.S.R. $505.
Pyrite, unroasted	121	352	--	Netherlands 230; West Germany 47; Republic of South Africa 45.
Salt and brine	129,735	235,310	215	West Germany 142,311; Italy 50,198; Belgium-Luxembourg 26,296.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	14,542	19,390	667	Netherlands 5,526; Switzerland 1,865; United Kingdom 1,581.

See footnotes at end of table.

Table 2.—France: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s. —Continued				
Sodium carbonate, natural and manufactured	388,778	254,422	30	Sweden 25,768; West Germany 22,918; Brazil 20,000.
Sodium hydroxide	96,624	97,309	453	Indonesia 19,900; Tunisia 6,932; Ivory Coast 4,695.
Sodium sulfate, natural and manufactured	32,338	30,933	NA	Italy 11,242; West Germany 11,010; Belgium-Luxembourg 1,539.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	160,026	144,180	33	Belgium-Luxembourg 46,702; West Germany 33,602; Netherlands 25,628.
Worked	54,036	48,656	545	Belgium-Luxembourg 21,379; West Germany 12,721; Saudi Arabia 3,654.
Dolomite, chiefly refractory-grade	45,570	32,421	2	Belgium-Luxembourg 10,362; West Germany 4,229; Ivory Coast 3,403.
Gravel and crushed rock thousand tons	11,247	10,419	4	West Germany 6,224; Switzerland 1,456; Belgium-Luxembourg 1,227.
Limestone other than dimension	165,463	209,167	--	West Germany 183,281; Belgium-Luxembourg 23,498; Portugal 1,500.
Quartz and quartzite	4,445	2,343	205	Belgium-Luxembourg 760; Italy 294; West Germany 269.
Sand other than metal-bearing thousand tons	4,232	3,855	(1)	West Germany 2,225; Italy 738; Switzerland 675.
Sulfur:				
Elemental:				
Crude including native and byproduct do	1,100	890	--	United Kingdom 213; Tunisia 150; Netherlands 103.
Colloidal, precipitated, sublimed	2,334	2,117	--	West Germany 482; Belgium-Luxembourg 469; United Kingdom 257.
Dioxide	6,922	2,275	NA	Belgium-Luxembourg 1,404; East Germany 700.
Sulfuric acid	199,150	198,650	--	Belgium-Luxembourg 148,826; Spain 28,193; Portugal 2,767.
Talc, steatite, soapstone, pyrophyllite	81,332	73,913	5,424	West Germany 24,335; Belgium-Luxembourg 9,252; United Kingdom 7,489.
Vermiculite	1,761	573	--	Venezuela 124.
Other:				
Crude thousand tons	r1,177	468	--	Belgium-Luxembourg 250; Switzerland 194; West Germany 20.
Slag and dross, not metal-bearing do	2,279	1,945	--	West Germany 960; Belgium-Luxembourg 798; Netherlands 77.
Oxides and hydroxides of barium, magnesium, strontium	9,363	2,702	76	United Kingdom 694; West Germany 538; U.S.S.R. 398.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	149,526	127,861	1,451	West Germany 24,579; Algeria 18,413; United Kingdom 15,227.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	5,879	8,540	--	United Kingdom 5,192; Belgium-Luxembourg 2,774; Spain 116.
Carbon: Carbon black	68,789	63,978	29	West Germany 17,753; Italy 15,446; Spain 10,221.
Coal:				
Anthracite	100,603	67,402	--	Belgium-Luxembourg 26,235; United Kingdom 16,284; Italy 9,678.
Bituminous	358,726	687,584	6	West Germany 405,008; Austria 83,155; Norway 75,641.
Briquets of anthracite and bituminous coal	50,249	26,443	--	United Kingdom 14,178; Belgium-Luxembourg 10,773; Switzerland 1,415.

See footnotes at end of table.

Table 2.—France: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal —Continued				
Lignite including briquets	6,617	6,765	--	Spain 6,492; West Germany 273.
Coke and semicoke	870,906	960,274	604	West Germany 306,429; Romania 110,680; Hungary 97,894.
Gas, natural million cubic feet	8,441	7,373	--	Belgium-Luxembourg 3,203; Switzerland 3,160; Austria 911.
Hydrogen, helium, rare gases	6,040	7,219	106	Spain 377; Switzerland 189; Algeria 157.
Peat including briquets and litter	1,680	496	--	Belgium-Luxembourg 153; Switzerland 117; Libya 56.
Petroleum and refinery products:[r]				
Crude 42-gallon barrels	555	672	--	Austria 621; West Germany 15; Japan 15.
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	8,183	8,944	19	Spain 3,630; Italy 823; United Kingdom 725.
Gasoline:				
Aviation do	9	(1)	--	NA.
Motor do	23,135	19,109	523	Switzerland 3,323; Netherlands 3,011; West Germany 2,975.
Mineral jelly and wax do	346	365	7	West Germany 117; Netherlands 72; Belgium-Luxembourg 35.
Kerosine and jet fuel do	10,962	10,189	(1)	Switzerland 2,502; Greece 1,181; Egypt 1,038.
Distillate fuel oil do	29,067	24,670	338	West Germany 8,066; Switzerland 6,658; Saudi Arabia 3,637.
Lubricants do	5,383	5,078	82	Belgium-Luxembourg 1,013; West Germany 577; Netherlands 321.
Residual fuel oil do	39,335	47,646	808	Italy 18,197; United Kingdom 4,462; West Germany 4,456.
Bitumen and other residues do	1,797	1,580	--	West Germany 677; Switzerland 630; Belgium-Luxembourg 184.
Bituminous mixtures do	329	252	(1)	Algeria 64; Belgium-Luxembourg 50; United Kingdom 24.
Petroleum coke do	49	13	--	West Germany 12.
Tars and other crude chemicals derived from coal, gas, and petroleum	274,096	385,401	45	West Germany 133,086; United Kingdom 74,590; Netherlands 64,793.

[r]Revised. NA Not available.
(1)Less than 1/2 unit.

Table 3.—France: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Cesium and rubidium value	$3,549	$4,968	NA	NA.
Lithium:				
Oxides and hydroxides	452	467	45	West Germany 242; China 142; U.S.S.R. 32.
Metal including alloys, all forms	27	6	--	Mainly from West Germany.
Alkaline metals	40	92	NA	NA.
Alkaline-earth metals	9	11	NA	NA.
Rare-earth metals	11	64	NA	Austria 52.
Aluminum:				
Ore and concentrate thousand tons	1,358	1,989	--	Guinea 1,544; Australia 222; Guyana 80.
Oxides and hydroxides	44,644	33,968	2,595	West Germany 23,205; Netherlands 4,941; United Kingdom 1,036.
Ash and residue containing aluminum	10,719	12,262	NA	West Germany 5,550; Netherlands 2,149; Italy 2,087.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Aluminum —Continued				
Metal including alloys:				
Scrap	56,671	60,615	360	Belgium-Luxembourg 16,751; West Germany 15,283; Netherlands 14,141.
Unwrought	332,451	300,370	3,604	Netherlands 81,546; West Germany 59,301; Greece 34,564.
Semimanufactures	219,986	200,301	4,310	West Germany 74,821; Belgium-Luxembourg 44,567; Italy 15,484.
Antimony:				
Ore and concentrate	8,823	10,998	NA	Thailand 3,625; Bolivia 2,314; Republic of South Africa 1,566.
Oxides	425	373	--	United Kingdom 191; Belgium-Luxembourg 155; West Germany 12.
Metal including alloys, all forms	348	552	NA	China 185; Spain 173; Bolivia 127.
Beryllium:				
Oxides and hydroxides value	$70,752	$84,091	$82,987	NA.
Metal including alloys, all forms	9	3	2	West Germany 1.
Bismuth: Metal including alloys, all forms	362	288	NA	Peru 76; Belgium-Luxembourg 56; Canada 49.
Cadmium: Metal including alloys, all forms	659	598	1	Belgium-Luxembourg 248; Netherlands 163; Australia 112.
Chromium:				
Ore and concentrate	278,773	146,435	(1)	Republic of South Africa 62,679; Madagascar 40,522; Turkey 19,700.
Oxides and hydroxides	6,970	5,549	2	West Germany 3,100; Italy 854; U.S.S.R. 723.
Metal including alloys, all forms	394	300	1	Japan 43; United Kingdom 42; undetermined 197.
Cobalt:				
Ore and concentrate	5,696	6,460	--	All from Morocco.
Oxides and hydroxides	201	182	5	United Kingdom 92; Belgium-Luxembourg 65; Canada 18.
Metal including alloys, all forms	1,140	1,133	229	Zaire 213; Japan 113; Norway 105.
Columbium and tantalum:				
Ore and concentrate	--	1	--	All from West Germany.
Metal including alloys, all forms:				
Columbium (niobium)	3	3	1	NA.
Tantalum	36	34	16	West Germany 13; United Kingdom 4.
Copper:				
Ore and concentrate	(2)	8	--	United Kingdom 4; Zaire 4.
Matte and speiss including cement copper	1,054	13	--	United Kingdom 10.
Oxides and hydroxides	719	904	NA	Italy 322; Romania 260; Belgium-Luxembourg 178.
Sulfate	2,935	2,993	NA	Italy 1,323; U.S.S.R. 832; Belgium-Luxembourg 187.
Ash and residue containing copper	3,511	4,727	NA	Belgium-Luxembourg 1,814; Netherlands 1,242; Canada 930.
Metal including alloys:				
Scrap	36,740	29,618	305	West Germany 7,693; United Kingdom 5,542; Belgium-Luxembourg 4,541.
Unwrought	434,467	412,108	2,086	Zambia 83,132; Chile 80,709; Belgium-Luxembourg 80,230.
Semimanufactures	206,790	169,953	2,018	Belgium-Luxembourg 73,806; West Germany 42,858; Italy 24,417.
Gallium: Metal including alloys, all forms	250	504	1	Belgium-Luxembourg 502.
Germanium: Metal including alloys, all forms value, thousands	$767	$1,399	$262	Belgium-Luxembourg $776; Japan $184; U.S.S.R. $84.
Gold:				
Waste and sweepings do	$13,318	$34,598	$936	Switzerland $30,222; Netherlands $950; West Germany $482.
Metal including alloys, unwrought and partly wrought:				
For domestic use thousand troy ounces	1,343	992	246	Switzerland 218; Netherlands 185; West Germany 167.
Temporary imports do	1,191	945	29	Switzerland 454; Netherlands 390; United Kingdom 20.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Hafnium: Metal including alloys, all forms ____ value	$16,193	$28,337	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite ____ thousand tons	18,643	16,511	--	Brazil 4,081; Sweden 2,751; Mauritania 2,511.
Pyrite, roasted	73,924	62,981	--	Italy 43,287; Spain 11,786; West Germany 7,906.
Metal:				
Scrap	455,082	347,429	408	Belgium-Luxembourg 123,125; West Germany 117,882; United Kingdom 77,430.
Pig iron, cast iron, related materials	505,449	433,455	160	West Germany 381,861; Sweden 18,698; Canada 18,460.
Ferroalloys:				
Ferrochromium	113,914	113,284	203	Zimbabwe 41,936; Republic of South Africa 31,332; Turkey 10,780.
Ferromanganese	48,575	33,796	--	Norway 18,933; Belgium-Luxembourg 5,891; West Germany 5,049.
Ferromolybdenum	1,471	1,630	NA	Belgium-Luxembourg 497; Austria 479; Italy 141.
Ferronickel	115,864	83,279	18	New Caledonia 73,552; Greece 3,570; Dominican Republic 2,671.
Ferrosilicochromium	334	157	NA	NA.
Ferrosilicomanganese	33,778	34,275	--	Belgium-Luxembourg 19,111; Norway 14,010; Republic of South Africa 678.
Ferrosilicon	20,647	28,720	--	West Germany 11,514; Norway 7,273; Italy 2,620.
Unspecified	2,693	3,172	110	Brazil 962; Belgium-Luxembourg 539; West Germany 322.
Steel, primary forms ____ thousand tons	2,321	1,940	1	Belgium-Luxembourg 1,249; West Germany 438; Italy 89.
Semimanufactures:				
Bars, rods, angles, shapes, sections ____ do	2,451	2,328	1	Belgium-Luxembourg 718; Italy 627; West Germany 601.
Universals, plates, sheets ____ do	2,830	2,801	1	Belgium-Luxembourg 1,189; West Germany 743; Italy 355.
Hoop and strip	411,483	362,708	213	West Germany 153,905; Belgium-Luxembourg 147,638; Italy 17,437.
Rails and accessories	62,451	46,763	4	Belgium-Luxembourg 35,033; United Kingdom 9,554; West Germany 1,679.
Wire	204,601	186,821	144	Belgium-Luxembourg 67,138; West Germany 52,257; Italy 29,979.
Tubes, pipes, fittings	559,420	601,691	2,484	West Germany 210,228; Italy 170,791; Belgium-Luxembourg 63,420.
Castings and forgings, rough	52,648	49,744	119	West Germany 26,992; Italy 8,759; Belgium-Luxembourg 5,157.
Lead:				
Ore and concentrate	139,029	142,449	--	Republic of South Africa 49,658; Morocco 25,820; Greenland 22,554.
Oxides	1,322	1,886	26	East Germany 607; Belgium-Luxembourg 605; West Germany 431.
Ash and residue containing lead	13,225	16,260	--	Italy 9,133; Belgium-Luxembourg 3,405; United Kingdom 2,382.
Metal including alloys:				
Scrap	31,187	21,055	43	Netherlands 11,563; Belgium-Luxembourg 6,068; West Germany 1,530.
Unwrought	55,088	40,620	2,876	United Kingdom 14,024; West Germany 10,882; Belgium-Luxembourg 8,720.
Semimanufactures	2,270	1,205	88	Belgium-Luxembourg 728; West Germany 333; Netherlands 11.
Magnesium:				
Metal including alloys:				
Scrap	225	329	--	Italy 219; Netherlands 78; West Germany 28.
Unwrought	3,953	4,210	861	Norway 2,678; Canada 223; United Kingdom 144.
Semimanufactures	311	327	24	Italy 154; West Germany 83; Spain 25.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical-grade thousand tons	1,226	881	(1)	Gabon 391; Republic of South Africa 345; Brazil 53.
Oxides	6,930	5,566	103	Belgium-Luxembourg 2,915; Spain 1,147; West Germany 622.
Metal including alloys, all forms	1,497	984	NA	Republic of South Africa 828; Netherlands 153.
Mercury 76-pound flasks	4,060	3,161	29	Spain 1,972; China 812; Switzerland 145.
Metalloids:				
Arsenic:				
Oxides and acids	128	236	NA	Belgium-Luxembourg 115.
Metal including alloys, all forms	211	143	11	Sweden 90; United Kingdom 21; China 10.
Boron including alloys, all forms	2	2	NA	Mainly from West Germany.
Phosphorus	60	481	NA	Italy 480.
Selenium	60	87	NA	Canada 11; United Kingdom 11; Japan 10; unspecified 55.
Silicon	5,954	4,323	3	West Germany 1,573; Sweden 864; Brazil 856.
Tellurium	6	10	(1)	Belgium-Luxembourg 6.
Unspecified	69	94	2	Italy 32; United Kingdom 24.
Molybdenum:				
Ore and concentrate	7,094	9,078	1,624	Canada 2,444; Chile 2,256; Belgium-Luxembourg 1,252.
Oxides and hydroxides	227	62	12	Netherlands 22; West Germany 14; Chile 9.
Metal including alloys:				
Scrap	NA	45	--	West Germany 17; Austria 7.
Unwrought	NA	18	4	Belgium-Luxembourg 3; West Germany 3; United Kingdom 3.
Semimanufactures	113	55	5	Austria 20; Netherlands 11; Belgium-Luxembourg 10.
All forms	150	--		
Nickel:				
Ore and concentrate	24	54	--	All from New Caledonia.
Matte and speiss	15,050	19,374	--	New Caledonia 17,904; Australia 633; Cuba 493.
Oxides and hydroxides	244	262	--	Canada 153; Cuba 60; Netherlands 31.
Ash and residue containing nickel	41	210	NA	NA.
Metal including alloys:				
Scrap	763	998	--	Italy 340; United Kingdom 190; Netherlands 110.
Unwrought	22,554	26,607	3,441	West Germany 5,933; U.S.S.R. 4,660; United Kingdom 3,514.
Semimanufactures	4,725	6,697	884	West Germany 3,294; United Kingdom 1,457; Sweden 425.
Platinum-group metals:				
Waste and sweepings value, thousands	$33,162	$17,460	$114	Netherlands $4,340; West Germany $2,562; Yugoslavia $2,378.
Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	114,297	280,871	204,287	U.S.S.R. 29,193; West Germany 19,805; Switzerland 11,574.
Platinum do	203,837	179,017	17,169	United Kingdom 34,209; Switzerland 29,354; U.S.S.R. 27,682.
Unspecified do	61,408	36,073	3,312	Belgium-Luxembourg 9,195; Republic of South Africa 8,295; United Kingdom 3,054.
Rhenium: Metal including alloys, all forms	3	9	9	
Silver:				
Waste and sweepings value, thousands	$68,006	$6,658	$405	Morocco $1,396; Switzerland $1,238; France $796.
Metal including alloys, unwrought and partly wrought thousand troy ounces	27,263	22,022	294	Switzerland 3,013; West Germany 1,873; Greece 1,754.
Tin:				
Ore and concentrate value	--	$552	--	All from Australia.
Oxides	178	140	NA	Italy 69; United Kingdom 37; West Germany 32.
Ash and residue containing tin	208	297	NA	Italy 270; Belgium-Luxembourg 17.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys:				
Scrap	194	23	--	Switzerland 20; Martinique 2.
Unwrought	10,524	8,910	3	Thailand 3,280; Indonesia 1,980; Malaysia 1,727.
Semimanufactures	209	415	2	West Germany 287; Netherlands 39; Belgium-Luxembourg 38.
Titanium:				
Ore and concentrate	111,330	160,827	NA	Australia 84,751; Republic of South Africa 61,225; Canada 8,253.
Oxides	13,696	14,373	4,608	Netherlands 4,783; West Germany 2,930; Belgium-Luxembourg 1,420.
Metal including alloys:				
Scrap	NA	224	28	West Germany 112; United Kingdom 74.
Unwrought	NA	1,037	296	Japan 548; West Germany 58; U.S.S.R. 52.
Semimanufactures	1,692	2,087	694	Japan 872; United Kingdom 284; West Germany 137.
All forms	1,117	--		
Tungsten:				
Ore and concentrate	1,438	1,160	--	Australia 354; China 188; Canada 136.
Oxides and hydroxides	8	43	--	West Germany 38; China 5.
Ash and residue containing tungsten value	$8,282	$2,576	NA	NA.
Metal including alloys:				
Scrap	NA	46	18	West Germany 14; Belgium-Luxembourg 4.
Unwrought	NA	163	6	West Germany 78; Austria 24; United Kingdom 15.
Semimanufactures	79	51	5	West Germany 16; Netherlands 13; Austria 5.
All forms	162	--		
Uranium and/or thorium:				
Ore and concentrate	5,003	5,058	333	Australia 4,610; China 100.
Metal including alloys, all forms, thorium value	$38,807	$20,793	NA	NA.
Vanadium:				
Ore and concentrate ---do---	--	$552	NA	NA.
Oxides and hydroxides	1,207	1,482	NA	West Germany 640; Finland 507; Republic of South Africa 244.
Ash and residue containing vanadium	--	2	NA	NA.
Metal including alloys:				
Unwrought	10	45	NA	West Germany 35.
Semimanufactures	9	(1)	NA	NA.
Zinc:				
Ore and concentrate	469,945	461,546	7,936	Canada 109,399; Peru 63,448; Sweden 55,935.
Oxides	6,184	5,214	2	West Germany 1,757; Belgium-Luxembourg 986; Netherlands 961.
Blue powder	2,317	2,279	--	Belgium-Luxembourg 1,103; Netherlands 868; West Germany 299.
Matte	4,011	2,881	NA	Belgium-Luxembourg 1,531; West Germany 1,166; Morocco 176.
Ash and residue containing zinc	39,241	44,621	NA	Peru 15,621; West Germany 10,868; Belgium-Luxembourg 10,485.
Metal including alloys:				
Scrap	4,981	8,877	--	Belgium-Luxembourg 4,999; Netherlands 2,706; West Germany 386.
Unwrought	124,119	84,977	49	Belgium-Luxembourg 32,523; Netherlands 22,092; West Germany 11,042.
Semimanufactures	7,009	8,431	1	West Germany 5,226; Italy 1,252; Belgium-Luxembourg 948.
Zirconium:				
Ore and concentrate	39,618	44,762	184	Australia 39,160; Republic of South Africa 5,010; West Germany 255.
Metal including alloys:				
Scrap	NA	44	NA	West Germany 36.
Unwrought	NA	102	102	
Semimanufactures	87	28	23	France 2; West Germany 2.
All forms	600	--		
Other:				
Ores and concentrates	20,107	20,268	NA	Greece 15,675; Peru 3,653; Italy 306.
Oxides and hydroxides	r7,075	8,156	117	West Germany 832; Sweden 471; Belgium-Luxembourg 215.
Ashes and residues	r15,180	4,904	9	Italy 3,000; Nigeria 432; Netherlands 254.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Other —Continued				
Pyrophoric alloys	129	70	NA	Brazil 30; Japan 20; Austria 19.
Cermets	16	21	1	Belgium-Luxembourg 18.
Waste and sweepings of precious and semiprecious metals value, thousands	$13,396	$5,564	$640	Republic of South Africa $1,806; Yugoslavia $745; United Kingdom $527.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	29,616	35,181	639	Turkey 25,020; West Germany 5,122; Italy 2,327.
Artificial:				
Corundum	7,237	4,951	567	West Germany 3,678; Austria 293; United Kingdom 201.
Silicon carbide	20,963	19,661	526	West Germany 6,495; Norway 5,722; Italy 1,747.
Dust and powder of precious and semiprecious stones:				
Including diamond kilograms	960	933	538	Republic of South Africa 234; Switzerland 77; United Kingdom 30.
Excluding diamond do	r66	42	NA	U.S.S.R. 13; Netherlands 10; Belgium-Luxembourg 6.
Grinding and polishing wheels and stones	8,859	8,984	118	Italy 2,358; West Germany 1,818; Belgium-Luxembourg 1,429.
Asbestos, crude	127,123	102,318	150	Canada 49,577; U.S.S.R. 22,315; Republic of South Africa 9,656.
Barite and witherite	14,610	12,935	--	West Germany 9,153; Morocco 2,989; Romania 330.
Boron materials:				
Crude natural borates	221,176	141,028	71,448	Turkey 68,949; Netherlands 398.
Oxides and acids	1,594	1,481	2	Italy 871; Turkey 303; China 89.
Cement	407,267	394,504	13	Belgium-Luxembourg 366,674; West Germany 14,394; Italy 10,528.
Chalk	42,183	45,178	11	West Germany 29,758; Belgium-Luxembourg 15,017.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	11,653	1,888	701	United Kingdom 389; West Germany 325.
Bentonite	76,063	89,112	15,113	Italy 30,809; Greece 21,095; West Germany 12,492.
Chamotte earth	10,672	7,121	--	West Germany 6,340.
Dinas earth	688	3,379	NA	West Germany 795.
Kaolin	338,662	280,343	48,933	United Kingdom 198,914; West Germany 18,091; Brazil 4,958.
Unspecified	210,683	215,486	8,491	West Germany 178,291; United Kingdom 20,978; Senegal 3,700.
Products:				
Nonrefractory thousand tons	1,501	1,008	(1)	Italy 453; West Germany 241; Spain 146.
Refractory including nonclay brick	226,299	230,818	1,377	West Germany 106,154; Belgium-Luxembourg 44,376; Austria 33,005.
Cryolite and chiolite	668	740	--	Denmark 667; Greenland 72.
Diamond:				
Gem, not set or strung carats	726,946	645,929	4,714	Belgium-Luxembourg 252,463; Israel 109,758; India 106,496.
Industrial thousand carats	690	1,171	59	Ireland 297; Central African Republic 226; Republic of South Africa 151.
Diatomite and other infusorial earth	9,164	9,352	4,523	West Germany 3,904; Spain 457; Denmark 219.
Feldspar, fluorspar, related materials:				
Feldspar	17,947	16,808	NA	West Germany 11,878; Portugal 2,689; Italy 1,028.
Fluorspar	27,766	12,308	NA	Republic of South Africa 11,020; United Kingdom 3.
Unspecified	50,532	47,855	NA	Norway 43,345; Netherlands 1,764; Canada 1,748.
Fertilizer materials:				
Crude, n.e.s	22,678	23,932	13	Netherlands 11,693; Belgium-Luxembourg 5,361; Italy 4,122.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured:				
Ammonia	413,069	180,760	(1)	Belgium-Luxembourg 48,464; West Germany 40,181; U.S.S.R. 31,881.
Nitrogenous thousand tons	1,822	1,743	232	Belgium-Luxembourg 616; Netherlands 607; West Germany 135.
Phosphatic do	904	619	87	Belgium-Luxembourg 233; Netherlands 122; Senegal 89.
Potassic do	455	352	--	Belgium-Luxembourg 132; Israel 80; U.S.S.R. 44.
Unspecified and mixed do	1,852	1,711	164	Belgium-Luxembourg 765; Netherlands 423; West Germany 197.
Graphite, natural	9,058	4,672	57	China 1,510; Madagascar 792; Italy 778.
Gypsum and plaster	21,386	23,284	18	Spain 12,088; West Germany 4,423; Switzerland 4,398.
Halogens:				
Bromine	2,817	2,348	NA	Israel 1,553; United Kingdom 496; Netherlands 157.
Chlorine	66,210	70,123	1	West Germany 25,458; Italy 12,317; Belgium-Luxembourg 11,264.
Iodine	1,100	899	NA	Japan 642; Chile 211; West Germany 21.
Lime	192,416	125,417	5	West Germany 68,979; Belgium-Luxembourg 53,265; Spain 2,222.
Magnesium compounds:				
Magnesite	107,247	106,414	3,543	Greece 31,434; Spain 21,300; Austria 13,645.
Oxides and hydroxides	9,315	4,617	--	United Kingdom 2,316; Norway 1,273; Austria 367.
Mica:				
Crude including splittings and waste	6,956	4,922	552	India 2,258; Tunisia 600; Madagascar 540.
Worked including agglomerated splittings	232	233	1	Belgium-Luxembourg 83; Switzerland 53; West Germany 30.
Nitrates, crude	9,111	10,544	--	Chile 10,465; Italy 27; Bulgaria 24.
Phosphates, crude thousand tons	5,450	4,622	752	Morocco 2,559; Togo 544; Israel 440.
Pigments, mineral:				
Natural, crude	205	171	NA	NA.
Iron oxides and hydroxides, processed	37,203	30,959	288	West Germany 22,119; Belgium-Luxembourg 5,624; Netherlands 1,258.
Potassium salts, crude	3	3	--	All from Tunisia.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material value, thousands	$154,073	$143,582	$2,939	Switzerland $68,817; Thailand $21,227; India $14,145.
Quartz crystal, piezoelectric do	$528	$53	NA	Switzerland $47.
Synthetic do	$2,812	$3,679	$727	West Germany $1,097; Switzerland $815; Mauritius $258.
Pyrite, unroasted	732	755	10	Italy 551; Belgium-Luxembourg 96; West Germany 78.
Salt and brine	139,160	160,781	293	Belgium-Luxembourg 72,286; Netherlands 32,122; West Germany 30,536.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,655	1,504	5	Spain 398; Belgium-Luxembourg 366; Netherlands 280.
Sodium carbonate, natural and manufactured	28,756	54,911	4	Poland 17,527; West Germany 13,336; East Germany 12,451.
Sodium hydroxide	226,968	221,266	1	West Germany 98,280; Belgium-Luxembourg 88,032; Netherlands 18,333.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	292,822	304,162	149	West Germany 77,304; Italy 51,445; Finland 43,366.
Worked	273,916	259,641	36	Spain 136,702; Italy 87,496; West Germany 22,515.
Dolomite, chiefly refractory-grade	411,094	362,511	--	Belgium-Luxembourg 230,523; West Germany 111,045; Italy 14,235.
Gravel and crushed rock thousand tons	4,541	4,227	(1)	Belgium-Luxembourg 3,744; United Kingdom 167; Norway 143.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Limestone other than dimension	172,792	237,600	--	Belgium-Luxembourg 237,440; West Germany 147.
Quartz and quartzite	82,692	52,095	576	Spain 35,615; Italy 11,772; West Germany 2,426.
Sand other than metal-bearing thousand tons	1,926	2,056	(1)	Belgium-Luxembourg 1,026; United Kingdom 816; Netherlands 169.
Sulfur:				
Elemental:				
Crude including native and byproduct	632,977	551,332	65,918	Poland 342,871; Canada 93,562; Belgium-Luxembourg 19,321.
Colloidal, precipitated, sublimed	586	256	6	West Germany 196; Belgium-Luxembourg 26; Netherlands 9.
Dioxide	112	658	NA	West Germany 657.
Sulfuric acid	190,757	153,643	1	West Germany 98,156; Belgium-Luxembourg 55,048.
Talc, steatite, soapstone, pyrophyllite	20,514	20,792	418	Italy 12,347; Belgium-Luxembourg 3,369; Spain 1,861.
Vermiculite	74,627	77,312	NA	Greece 29,762; Republic of South Africa 26,667; Italy 9,166.
Other:				
Crude thousand tons	r1,000	1,100	3	Switzerland 748; West Germany 99; Spain 96.
Slag and dross, not metal-bearing do	1,281	1,161	--	Belgium-Luxembourg 624; West Germany 331; Canada 90.
Oxides and hydroxides of barium, magnesium, strontium	1,132	1,046	196	West Germany 390; Ireland 179; Japan 86.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	172,065	168,903	436	Italy 65,402; Belgium-Luxembourg 47,017; West Germany 23,004.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	18,154	5,792	1,359	Belgium-Luxembourg 4,357; West Germany 40.
Carbon: Carbon black	84,784	76,846	2,307	Netherlands 38,609; West Germany 24,733; Italy 6,013.
Coal:				
Anthracite thousand tons	2,534	1,489	57	West Germany 490; Republic of South Africa 404; U.S.S.R. 288.
Bituminous do	27,279	25,882	9,193	Republic of South Africa 7,555; West Germany 3,914; United Kingdom 2,547.
Briquets of anthracite and bituminous coal	148,948	112,037	--	West Germany 93,477; Belgium-Luxembourg 14,908; Italy 3,590.
Lignite including briquets	168,340	160,462	--	West Germany 159,847; Belgium-Luxembourg 574.
Coke and semicoke thousand tons	3,011	2,395	105	West Germany 1,936; Belgium-Luxembourg 183; Netherlands 152.
Gas, natural million cubic feet	712,333	626,526	--	Netherlands 376,436; U.S.S.R. 115,894; Norway 91,577.
Hydrogen, helium, rare gases	38,714	33,517	227	Belgium-Luxembourg 25,238; Netherlands 4,298; West Germany 3,020.
Peat including briquets and litter	147,536	114,013	--	West Germany 65,844; Netherlands 21,604; U.S.S.R. 18,490.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	733,770	664,335	--	Saudi Arabia 340,364; Abu Dhabi 42,926; Nigeria 40,105.
Refinery products:				
Liquefied petroleum gas do	6,481	41,336	(1)	Algeria 30,474; Saudi Arabia 6,902; United Kingdom 1,212.
Gasoline:				
Aviation do	190	191	--	Italy 100; United Kingdom 53; Netherlands 38.
Motor do	33,613	37,684	103	Italy 6,774; Algeria 4,936; U.S.S.R. 2,927.
Mineral jelly and wax do	164	334	20	Netherlands 139; West Germany 81; United Kingdom 57.
Kerosine and jet fuel do	2,861	455	66	Netherlands 169; United Kingdom 75; Norway 72.
Distillate fuel oil do	25,799	31,905	418	U.S.S.R. 11,547; United Kingdom 4,116; Netherlands 2,118.

See footnotes at end of table.

Table 3.—France: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Lubricants thousand 42-gallon barrels	1,409	1,029	55	Netherlands Antilles 198; Belgium-Luxembourg 151; Italy 147.
Residual fuel oil ——do——	53,418	49,035	1,025	Romania 6,997; Greece 5,792; U.S.S.R. 5,442.
Bitumen and other residues do	181	75	(1)	West Germany 51; Belgium-Luxembourg 19; Netherlands 2.
Bituminous mixtures ——do——	79	68	3	Belgium-Luxembourg 30; West Germany 22; Netherlands 3.
Petroleum coke ——do——	9,460	6,684	5,936	United Kingdom 460; West Germany 266; Belgium-Luxembourg 10.
Tars and other crude chemicals derived from coal, gas, and petroleum	834,283	607,879	247,923	Belgium-Luxembourg 78,615; Italy 71,561; West Germany 19,104.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]Unreported quantity valued at $1,656.

COMMODITY REVIEW

METALS

Aluminum.—Development of the bauxite mine based on the La Brasque deposit near Toulon, in the south of France, was underway during 1982. The mine's recoverable reserves were reported at 1 million tons. Life of the mine was planned for 6 years; the yearly production will peak at 300,000 tons. Development costs were reported at $1.6 million, and the mine will employ 65 persons.

The largest producer of aluminum, Péchiney Ugine Kuhlmann (PUK), showed a deficit after nationalization and was asking for assistance from the Government. High prices for electricity, high interest on loans, and depressed markets have affected the financial results of the company. At the aluminum smelter at Saint-Jean-de-Maurienne, an old potline with a capacity of 14,000 tons per year was closed.

Antimony.—The antimony mine and concentrator at Ty Gardien a Quimpere, owned by Société Cheni, a wholly owned subsidiary of Coframines, was preparing to close during 1983. The company had been aware that reserves at Ty Gardien were small, but the very fast depletion of reserves was not expected. Production had started before complete exploration of the deposit was undertaken in the belief that costs of starting production with a short mine life would be less than to further explore the deposit.

Cobalt.—Metaux Speciaux S.A., a subsidiary of PUK, stopped production of cobalt metal at the plant located at Pompliers-Saint-Marcel, Savoie. Low prices and difficulties obtaining concentrates from the Bou Azzer Mine in Morocco promoted the decision to end production.

Gold.—At the Salsigne gold mine located on the southern flanks of the Montagne Noir near Salsigne, north of Carcassonne in the southwestern part of France, a new shaft, Castan, was commissioned. The shaft was 350 meters deep with 14 levels 45 meters apart and has replaced the old shaft, Bru. With the new shaft in operation, mining of the Salsigne Mine was shifted from all opencast mining to mining equally divided between opencast and underground.

During the summer, production of gold started at a mine near Bourneix, Haute Vienne. The operator was Société Minière Bourneix S.A. Coframines, a subsidiary of BRGM, owned 31.25% of the Bourneix. The new mine had a loss of about $550,000 during the year, resulting from startup problems.

Iron and Steel.—The steel industry, including iron ore mines, had a difficult year, mostly resulting from worldwide recession and difficulties from nationalization. The Government expressed a desire to streamline and make more effective the newly acquired industry, but the restructuring plan was not made public at yearend.

Tungsten.—Two new mines started pro-

duction during 1982. The mine at Favieres, near Frejus, an opencast operation, was the first. It was planned to reach an output of 350 tons per year of finished gravity concentrates averaging 72% WO_3 and 75 tons per year of low-grade concentrates averaging 48% WO_3. The Montbelleux Mine, at Luitre, near Fougères Iles-de-Vilaine, was the other mine. Montbelleux, which was earlier operated until 1956, was owned by the Société des Mines de Montbelleux, which was part of the Hochschild Group. Measured reserves at the mine total 3 million tons with an average content of 0.25% WO_3 and 0.12% Sn. In addition to tungsten, the facilities at the Montbelleux recover modest quantities of tin.

NONMETALS

Barite.—At the Chaillac Mine, the largest barite producer in France, production stopped for several weeks because of a fire that destroyed key elements in the system that provided electrical power to the mine. However, the company, Société Barytine de Chaillac, was able to meet its contractual obligations by sales of barite from its stocks.

At the Lacan a Bertholen Mine at Aveyron, which produced barite with an average content of 70% $BaSO_4$ and was operated by the Société des Produits Chimiques de Viviez, an installation for preconcentration was completed. Capacity of the new installation was estimated at 60,000 tons of product per year.

Clays.—BRGM, under the program, L'Inventaire des Ressources Minières de la France (Inventory of the Mineral Resources of France), discovered a layer of attapulgite in the tertiary basins of the Massif Armoricain in the central part of France. Assessment of preliminary results of the exploration was underway at yearend.

Bentonite.—As part of the French Government's effort to explore minerals on French national territory, the geologist of BRGM located indications of possible bentonite deposits in the sedimentary basin at Malzieu, Lozer, and Forez.

Fluorspar.—At the Fonsant Mine, Var, owned by the Société d'Entreprises Carrieres et Mines d'Esterel, development of a new level was completed. With this operation, reserves to sustain 4 years of production at present levels of output were made ready for use.

At the Montroc Mine, Tarn, owned by the Société General de Recherches et d'Exploration Minières, reclamation of a valley used as a mine dump was complete. The dump was covered with humus and about 5 hectares of land was made usable for agriculture and returned to their owners. At the same mine, the concentrator has been modified so that it can produce a concentrate with 99% CaF_2.

The Compagnie Française de Mokta has closed its mine at l'Argentolle, Saone-et-Loire, because reserves were exhausted. As replacement for l'Argentolle, Mokta started production from the Sommant deposit, located near the existing operation at Reclasen, Saone-et-Loire. Reportedly, the Sommant deposit has limited reserves.

Talc.—At the talc mine at Trimouns near Luzenac, Ariége, operated by Talcs de Luzenac and located at an altitude of 1,800 meters, new equipment for removal of the overburden was purchased and used. Introduction of the new equipment has increased the productivity per man shift from 193 cubic meters in 1981 to 283 cubic meters in 1982.

In the talc mill at Luzenac, which processed ores from the mine at Trimouns, computers were used to control the operation of crushers. Productivity of the plant increased by 50% and the product was more uniform. An experimental optical sorter was tried during the year at Luzenac; results were good, and management decided to introduce the sorter in 1983 and start using it on a full scale basis in 1984.

MINERAL FUELS

Coal.—Targets for domestic production of coal set by the new NEP, developed by the Socialist Government, appeared to be too high for the domestic coal industry at yearend 1982. The desired consumption of about 50 million to 60 million tons per year was to be met by equal shares of domestic and imported coal in France's coal supply. However, adverse mining and geological conditions in most coal mines in France made introduction of mass mining methods difficult. Opencast mining could be introduced in a small number of deposits, mostly lignite. In other deposits, seams are deeplying and steep, with gas and water present.

French ports will have to be ready to handle larger volumes of coal than anticipated. At yearend, planning was underway to modernize major coal ports at Dunkirk, Le Havre, Rouen, and Marseilles and increase their coal-handling capacity.

Expansion of production in the coal mine near Carmaux, Tarn, was underway. The mine, an underground operation, had about 6 million tons of reserves. Exploration was

conducted in the vicinity of present operations, and about 15 million tons of reserves of good coking coal was discovered. Planning was started for development of a new opencast mine based on these reserves, which at planned rates of production should last to the year 2010.

Natural Gas.—France concluded two agreements for imports of natural gas, one with Algeria and the other with the U.S.S.R. The French Government-owned Gaz de France concluded with Soyuzgasexport from the U.S.S.R. an agreement for delivery of 280 billion cubic feet of Soviet natural gas over 25 years, starting in 1984. The price of gas will be determined on an index based on world market prices of other energy sources.

After 2 years of difficult negotiations, Gaz de France and Société Nationale pour la Recherche, la Production, le Transport, la Transformation, et la Commercialisation des Hydrocarbures (SONATRACH) of Algeria concluded an agreement for deliveries of Algerian liquefied natural gas to France. For 20 years, SONATRACH will deliver to France 320 billion cubic feet of natural gas per year at an f.o.b. price of $5.15 per million British thermal unit (Btu). Transportation costs should bring the price of gas delivered to France to $16 per million Btu.

Petroleum.—The declining French domestic crude oil production was small when compared to demand. Results of exploration for oil and gas were disappointing, and no major finds were announced. Exploratory footage was lower, but the number of completions increased when compared with results in 1981 as a result of shallow drilling in Alsace, Lorraine, and Jura.

At yearend 1982, about 102 licenses for exploration were valid in France. Twenty-one new licenses were granted during the year. About 50 wells with an approximate footage of 271,000 feet were drilled. Roughly 50,000 feet was drilled offshore. In the old field, Schebenhard, in Alsace, three wells were completed and all were producers. This field had been abandoned in 1968 as exhausted. However, the present operator, Société National Elf Aquitaine (SNEA), believed that the Schebenhard Field had more crude oil in its reservoir rock. Three additional wells were planned in 1982 to complete the appraisal of the field's capability.

Although France's domestic crude oil production was insignificant by world standards, France was an important processor of imported crude oil. About 98% of the demand for crude oil was met by imports.

The refining capacity in France dropped by 50,000 barrels per day and, at yearend, was reported at 2.82 million barrels per day, the lowest figure since 1971. Although the capacity was low, the refineries operated during the year at 58% of capacity. Three refineries were closed in 1982—Valenciennes, owned by SNEA, with a capacity of 66,000 barrels per day; Haunoncourt, owned by SRL, with a capacity of 100,000 barrels per day; and Dunkerque, with a capacity of 88,000 barrels per day. In addition, old refining units were closed at Notre Dame de Gravenchon, capacity of 10,000 barrels per day, owned by Mobil Oie Francaise S.A.; and Petite Couronne, 96,000 barrels per day, owned by Shell Francaise S.A. However, an increase of capacity by 16,000 barrels per day was recorded at the refinery at Donges, owned by SNEA, where two old units with aggregate annual capacity of 180,000 barrels per day were replaced by one plant with a capacity of 196,000 barrels per day.

Uranium.—The Government-owned Compagnie Générale des Matières Nucleariés (COGEMA) continued exploration on the recently discovered Contras uranium deposit in Gironde. Total reserves at the Contras deposit were set at 20,000 tons of U_3O_8.

The Government-owned Compagnie Française des Pétroles acquired the holdings of PUK in Minatom and also acquired the Dong Trieu Mining Co., previously owned by the Empain Schneider Group.

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[1]Physical scientist, Division of Foreign Data.

[2]Annuaire Statistique de la France. Paris, 1982, 832 pp.

[3]Where necessary, values have been converted from French francs (F) to U.S. dollars at an average rate of F6.7=US$1.00.

The Mineral Industry of Gabon

By Ben A. Kornhauser[1]

The gross domestic product (GDP) of Gabon in 1982 was around $3.28 billion, which was 12% greater than the GDP of $2.94 billion in 1981 but stagnant in real terms when inflation is considered.[2] Of the 1982-83 budget, $803 million was for investments, of which the largest portion was allocated to the Trans-Gabon Railroad and infrastructure.[3] Petroleum and mining were expected to provide the base for economic expansion in the future. In May 1982, six Western European countries signed an agreement with the Gabon Government to construct the second phase of the Trans-Gabon Railroad at a cost of $560 million. This 352-kilometer section from Booue to Franceville was to be completed by late 1987.[4] The first phase of 342 kilometers from Libreville to Booue was completed in December 1982 and was to be dedicated in January 1983. In March, France signed an agreement involving $328,000 to aid in funding the vast program of surveying and prospecting for minerals that started in 1981. The program was expected to take 10 years at a total cost of $30 million to survey one-half of the national territory. The mining inventory program would consist of three phases: the first completed phase, financed by Gabon for about $3 million, was the airborne magnetic survey; the second phase, involving airborne geophysical reconnaissance, was to be performed in 1982 with the $6 million cost to be divided between Gabon and the European Development Fund; the third phase would be prospecting and geochemical sampling of up to 15,000 square kilometers per year by three teams of geologists including the Service Géologique Nationale, France's Bureau de Recherches Géologiques et Minières (BRGM), and a third independent team.

PRODUCTION AND TRADE

The depressed world economy discouraged the flow of funds into Gabon's mineral industry development, hindering its future production growth, except for petroleum exploration. In 1982, the value of petroleum production amounted to $1.56 billion and contributed 50% of the GDP, more than 60% of the budget income, and 76% of the country's exports. The value of mine production increased 10% over that of 1981.

Gabon continued as the major supplier of oil to France's Société Nationale Elf-Aquitaine (SNEA), supplying 45 million barrels per year in 1982. Gabonese exports of crude oil in 1982 totaled 47.6 million barrels compared with 45.6 million barrels in 1981 at values of $1.66 billion and $1.45 billion, respectively. This increased value was due in part to the appreciation of the dollar, which also benefited Gabon in its dollar-denominated sales of manganese ore. In 1982, exports amounted to $2.05 billion compared with imports of $830 million, producing a balance-of-trade surplus of $1.22 billion. The Chinese Petroleum Corp. sought to increase its imports of Gabonese crude oil of 10,000 barrels per day from the Société Nationale des Petroles Gabonais, the state-owned company.

Table 1.—Gabon: Production of mineral commodities[1]

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Cement, hydraulic—metric tons	[e]190,000	96,205	109,430	149,913	175,103
Diamond, gem and industrial—carats	NA	25,913	NA	NA	NA
Gas, natural:					
Gross—million cubic feet	64,449	[e]64,000	[e]58,000	66,073	66,275
Marketed—do	5,827	6,549	2,538	2,684	2,304
Gold, mine output, metal content—troy ounces	965	964	553	[e]550	550
Manganese:					
Ore, gross weight (50% to 53% Mn)—metric tons	1,616,516	2,188,445	2,044,049	1,359,954	1,406,000
Pellets, battery- and chemical-grade, gross weight (82% to 85% MnO_2)—do	93,905	111,649	102,703	127,584	105,000
Total—do	1,710,421	2,300,094	2,146,752	1,487,538	1,511,000
Petroleum and refinery products:					
Crude—thousand 42-gallon barrels	76,176	70,991	64,444	54,386	56,456
Refinery products:					
Gasoline—do	1,142	850	886	648	502
Jet fuel and kerosine—do	2,308	740	1,391	728	721
Distillate fuel oil—do	3,275	2,286	2,545	4,117	2,246
Residual fuel oil—do	5,662	4,150	4,140	2,182	3,583
Other—do	2,496	684	142	752	717
Refinery fuel and losses—do	534	274	14	20	282
Total—do	15,417	8,984	9,118	8,447	8,051
Uranium oxide (U_3O_8), content of concentrate—metric tons	1,205	1,297	1,218	1,604	1,151

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through June 20, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) is also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

Table 2.—Gabon: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1978	1979	Destinations, 1979	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	9	33	--	Ivory Coast 19; Senegal 8; France 5.
Copper: Metal including alloys, scrap	26	6	--	All to France.
Iron and steel: Metal:				
Scrap	--	79	--	Belgium-Luxembourg 38; West Germany 20; Hungary 20.
Semimanufactures: Tubes, pipes, fittings	703	81	--	Zaire 80; France 1.
Lead: Metal including alloys, unwrought	9	10	--	All to Belgium-Luxembourg.
Manganese: Ore and concentrate—thousand tons	1,694	2,206	144	France 525; Norway 280; Poland 141.
Uranium and/or thorium: Ore and concentrate—value, thousands	$93,877	$117,510	--	All to France.
NONMETALS				
Cement	--	256	--	All to Angola.
Other: Crude	470	(1)	(1)	
MINERAL FUELS AND RELATED MATERIALS				
Petroleum, crude—thousand 42-gallon barrels	63,972	61,287	14,255	France 9,917; Chile 8,627; Brazil 5,245.

[1]Less than 1/2 unit.

Table 3.—Gabon: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1978	1979	Sources, 1979	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	2	1	--	All from France.
Metal including alloys:				
Unwrought	--	1	--	Do.
Semimanufactures	358	337	--	France 187; United Kingdom 93; Yugoslavia 35.
Chromium: Oxides and hydroxides value, thousands	$1	--		
Copper:				
Matte and speiss including cement copper	1	(1)	--	All from France.
Metal including alloys:				
Unwrought	1	1	--	Do.
Semimanufactures	68	42	(1)	Mainly from France.
Iron and steel: Metal:				
Scrap	--	6	--	All from France.
Pig iron, cast iron, related materials	2	1	--	Do.
Ferroalloys, unspecified	154	35	--	Mainly from West Germany.
Steel, primary forms	3	1	--	All from France.
Semimanufactures:				
Bars, rods, angles, shapes, sections	14,896	6,156	(1)	France 5,809; Italy 247.
Universals, plates, sheets	8,306	2,828	--	France 1,866; Japan 672; Belgium-Luxembourg 256.
Hoop and strip	219	63	--	France 27; West Germany 23; United Kingdom 13.
Rails and accessories	34,788	1,346	--	Italy 1,301; France 35.
Wire	960	300	--	West Germany 152; France 121; Republic of Korea 15.
Tubes, pipes, fittings	10,427	9,810	899	France 6,688; West Germany 1,445; Japan 391.
Lead:				
Oxides	18	3	--	All from France.
Metal including alloys:				
Unwrought	7	--		
Semimanufactures	2	20	--	France 15; Belgium-Luxembourg 5.
Nickel: Metal including alloys, semimanufactures	32	13	(1)	Mainly from France.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$16	$28	--	France $23; Republic of Korea $5.
Tin: Metal including alloys:				
Unwrought	1	1	--	All from France.
Semimanufactures	2	2	--	Do.
Titanium: Oxides	11	32	--	Do.
Uranium and/or thorium: Metal including alloys, all forms value, thousands	--	$1	$1	
Zinc:				
Oxides	1	--		
Metal including alloys, semimanufactures	18	9	--	All from France.
Other:				
Ores and concentrates	--	3	--	Do.
Base metals including alloys, all forms	78	20	--	Mainly from United Kingdom.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$1	$2	--	All from France.
Artificial, corundum	8	1	--	Do.
Grinding and polishing wheels and stones	37	27	(1)	France 23; Italy 1; Sweden 1.
Asbestos, crude value, thousands	$1	--		
Barite and witherite	576	4,173	--	Ireland 2,179; Italy 1,860; France 94.
Boron materials:				
Crude natural borates	(1)	8	4	Netherlands 4.
Oxides and acids	8	20	--	All from France.
Cement	100,336	20,635	1	France 7,542; Belgium-Luxembourg 5,195; Spain 3,990.
Chalk	47	249	--	All from France.
Clays and clay products:				
Crude, unspecified	181	1,835	--	France 1,138; Spain 697.
Products:				
Nonrefractory	3,172	2,397	1	Italy 1,102; France 968; Spain 163.
Refractory including nonclay brick	93	1,212	--	France 1,176; Italy 36.
Diatomite and other infusorial earth	241	256	--	France 236; Belgium-Luxembourg 20.
Fertilizer materials:				
Crude, unspecified	--	11	--	Mainly from Japan.
Manufactured:				
Ammonia	37	52	--	France 22; Netherlands 20; Belgium-Luxembourg 10.

See footnotes at end of table.

Table 3.—Gabon: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	Sources, 1979	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured —Continued				
Nitrogenous	220	429	--	France 247; West Germany 102; Netherlands 80.
Phosphatic	--	473	--	Belgium-Luxembourg 451; Netherlands 22.
Potassic	44	807	--	Netherlands 806; France 1.
Unspecified and mixed	--	29	1	France 28.
Halogens: Unspecified value, thousands	$2	$2	--	All from France.
Lime	1,175	2,925	--	Belgium-Luxembourg 2,041; France 430; Netherlands 304.
Magnesium compounds: Magnesite	--	575	--	United Kingdom 532; France 43.
Mica:				
Crude including splittings and waste	6	20	--	All from France.
Worked including agglomerated splittings	(1)	--		
Nitrates, crude	15	6	--	All from France.
Phosphates, crude	1	--		
Pigments, mineral: Iron oxides and hydroxides, processed	5	7	--	All from France.
Potassium salts, crude	--	111	--	France 40; West Germany 40; Netherlands 21.
Precious and semiprecious stones other than diamond -- value, thousands	$10	$1	--	All from France.
Salt and brine	1,371	5,423	--	Senegal 2,397; France 1,640; West Germany 868.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	2	14	--	All from France.
Sodium hydroxide	602	1,538	722	France 603; West Germany 202.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	861	--		
Worked	2,594	138	--	Italy 119; France 19.
Gravel and crushed rock	32,039	92	--	France 84; Belgium-Luxembourg 8.
Limestone other than dimension	350	525	--	France 431; Morocco 93.
Quartz and quartzite	--	19	--	Norway 17; France 2.
Sand other than metal-bearing	234	293	20	France 268; Netherlands 4.
Sulfur:				
Elemental:				
Crude including native and by-product	1,710	2,900	--	All from France.
Colloidal, precipitated, sublimed value, thousands	$1	--		
Sulfuric acid	464	781	1	Belgium-Luxembourg 684; France 59.
Talc, steatite, soapstone, pyrophyllite	549	24	--	All from France.
Other:				
Crude	54	10	--	Do.
Oxides and hydroxides of barium, magnesium, strontium	9	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	592	549	--	France 530; Belgium-Luxembourg 12.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	699	--	All from Spain.
Carbon: Carbon black	38	21	--	All from France.
Coal: Briquets of anthracite and bituminous coal	10	(1)	--	Do.
Coke and semicoke	30	--		
Petroleum and refinery products:				
Crude--42-gallon barrels	7	--		
Refinery products:				
Liquefied petroleum gas do	2,111	603	--	France 499; Italy 93.
Gasoline do	14,790	51,697	14,841	France 16,813; Netherlands 11,858.
Mineral jelly and wax value, thousands	$1	$2	--	All from France.
Kerosine and jet fuel 42-gallon barrels	44,144	20,770	--	France 20,002; Iran 364.
Distillate fuel oil do	22,059	29,549	--	France 27,654; Brazil 1,895.
Lubricants do	33,341	30,009	903	France 24,724; Belgium-Luxembourg 2,513; Ivory Coast 686.
Residual fuel oil do	--	1,192	--	All from France.
Bitumen and other residues do	14,218	2,910	--	Ivory Coast 1,656; France 962; Netherlands 226.
Tars and other crude chemicals derived from coal, gas, and petroleum	17	32	--	France 30, Netherlands 2.

[1]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Manganese.—The Compagnie Minière de L'Ogooue S.A. (COMILOG), Gabon's only manganese producer, built a heavy-media classification plant in 1982 to upgrade fines to a 49% to 50% manganese product. In 1982, COMILOG's production dropped to 58% of capacity, equal to 1,511,930 tons of ore with an average grade of 51% manganese. Included in this total was 105,476 tons of battery-grade ore averaging 83% to 85% manganese dioxide. Fifty to seventy percent of the metallurgical-grade ore went to northern and Western Europe; 14% to 25% to North America; and 5% to 14% to Eastern Europe. One-quarter of the battery-grade ore was exported to Europe, and 70%, to other countries, chiefly in the Far East. United States Steel Corp. reduced its interest in COMILOG from 40.76% to 38.7% during the year. The remaining interests were distributed between the Gabon Government (20%), the BRGM subsidiary Compagnie Française des Mines (17.6%), Imetal S.A. (14.8)%, and other French interests (8.9%). Plans to expand mine capacity and to build a new ferromanganese alloy plant were awaiting the construction of the Trans-Gabon Railroad to Moanda and more favorable market conditions. At present, production was limited by the capacity of the aerial tramway that carried the ore from Moanda to M'Binda in the Congo for transport by railroad to Pointe Noire in the Congo for export. The Société Gabonaise des Ferroalliages was still studying the feasibility of a ferromanganese project at Haut-Ogooue, the proposed site of a hydroelectric plant. To be viable, the plant required the construction of the railroad to Moanda and completion of the Poubara II Dam.

The Government of Gabon and COMILOG became major shareholders in the French ferromanganese plant, Société de Ferromanganese de Paris-Outreau (SFPO), located in Boulogne-Sur-Mer, France, to insure a market for their manganese ore. The plant had considered closing owing to a recent financial adversity. SFPO, the largest ferrromanganese operation in Europe and one of the leading producers in the world, had been a major supplier to the U.S. market. Ownership of SFPO was BRGM (35%), COMILOG (35%), state-owned Société Nationale D'Investissement du Gabon (20%), Acieries de Paris et D'Outreau (5.7%), and Compagnie Financiere de Paris et des Pays-Bas (4.3%).

NONMETALS

Barite.—An investment of $13.4 million was considered necessary to exploit the barite deposit at Dourekiki in Nyanga Province, north of the Mayumba region in southwest Gabon. The Nyanga Mining Co. was to be set up by the Government, Essence et Lubrificants de France (ELF)-Gabon Oil Co., COMILOG, BRGM, and a U.S. mining company. Transportation costs will be a major factor in the development of the project. Either a bridge must be built or the ore must be shipped by river barge to the Port of Mayumba where about 5,000 tons would be processed for domestic use and export. The barite deposits were estimated to range from 0.8 to 1.2 million tons with a potential output of 25,000 to 30,000 tons per year.

MINERAL FUELS

Petroleum.—In 1982, an estimated 56.5 million barrels per year were produced compared with 54.4 million barrels per year in 1981. Recent discoveries that resulted from increased petroleum investment stabilized production at this level, but an increase to 58 million barrels per year was expected in the near future.

The reserves discovered in four wells in 1982 were at least equivalent to annual production and were expected to stem the decline in reserves for the time being. Amoco Gabon Exploration Co., an affiliate of Standard Oil Co. of Indiana, found oil in the Gombe Sud Marin Permit. The well tested at a combined rate of 6,000 barrels per day from three intervals. Amoco Gabon also was awarded the Omboue exploration permit.

ELF-Gabon made two oil discoveries offshore central Gabon on sites held jointly with SNEA. One discovery involved the Nord Marine 1 Gonelle extension well, near the Gonelle Field, where the Batanga sandstone contained oil at a depth of 43 meters. The other discovery involved the West Marine 1 Manderos well, near the Manderos Field, where the Batanga sandstone contained oil at a depth of 11 meters. From testing so far, each of these wells had an estimated potential of producing 630 barrels per day.[5]

Amoco Gabon made six operational borings in the area south of Port Gentil, of

which four holes showed commercial possibilities and were producing 10,600 barrels per day. Up to that point, Amoco Gabon had invested $60 million in Gabon, expected to invest more than $99 million by 1984, and intended to increase the Port Gentil production to 33,000 barrels per day in 1983.

ELF-Gabon discovered oil at a well located on the Ndoube Marin prospecting permit, which was owned wholly by ELF-Gabon. The Muruba Marine 2 exploratory well, located 300 kilometers southeast of Port Gentil at a water depth of 65 meters, was about 3,000 meters deep and crossed two sandstone reservoirs that contained oil. Flows of 570 and 1,230 barrels per day were obtained from the two depths.[6]

Amoco Gabon's Gombe Marine Sud-2 well tested between 1,000 and 3,000 barrels per day from three horizons. The well was located about 20 miles from the Inguessi discovery but on a block that was wholly owned by Amoco Gabon. The block is now owned by British Petroleum Co. Ltd. (15%), Wintershall AG (18.5%), Preussag AG and Deutsche Schachtbau (8.25% each), and Amoco Oil Co. (50%), the operator.[7] ELF-Gabon also announced two discoveries. Its Torpille Nord-1 well tested 2,013 barrels per day in its wholly owned Terpille concession, and the Barbier Sud-Ouest-1 well tested 1,667 barrels per day.

Uranium.—The Compagnie des Mines d'Uranium de Franceville (COMUF) dedicated its new uranium processing plant at Mounana in June 1982. Plant capacity was increased by 50% from 300,000 to 450,000 tons of ore per year or 1,500 tons of uranium metal per year. The new plant, which cost $47.6 million, used an acid leach-solvent extraction process to produce a magnesium uranate concentrate containing 75% uranium. In 1982, production decreased to 65% of capacity as COMUF limited output to the level of demand. France continued as the principal purchaser of uranium under a long-term contract to buy 1,000 tons of uranium metal annually. Reasonably assured reserves, as estimated by the International Atomic Energy Agency as of January 1981, were 19,400 tons of uranium based on a $36-per-pound price. This estimate excluded about 5,000 tons of uranium in the Bagombe deposit discovered in 1981.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from African Financial Community francs (CFAF) to U.S. dollars at the rate of CFAF333=US$1.00. The official CFAF exchange was maintained at 50 CFAF per French franc and was freely convertible.

Paris Marches Tropicaux et Mediterraneens. No. 1940, Jan. 14, 1983, pp. 73-79.

[3]African Report. July-August 1982, p. 35.

[4]Paris Marches Tropicaux et Mediterraneens. No. 1945, Feb. 18, 1983, pp. 405-406.

[5]———. No. 1900, Apr. 9, 1982, p. 972.

[6]Libreville L'Union. Feb. 16, 1982, p. 1.

[7]Petroleum Economist. May 1982, p. 205.

The Mineral Industry of the German Democratic Republic

By George A. Rabchevsky[1]

The economy of the German Democratic Republic (GDR), in contrast to other Council for Mutual Economic Assistance (CMEA) member countries, continued a relatively high growth rate in 1982, although below the 1981-85 5-year plan, which called for restrained high growth through the mid-1980's. This growth was reflected in all sectors of the mineral industry. Despite the world recession in the fertilizer industry, for example, the GDR managed to maintain its export volume of potash at or close to the levels reached before the recession. The GDR's mineral economy continued to consist primarily of processing. Raw materials were purchased from CMEA partners, especially the U.S.S.R., and converted into semifinished and finished products. Although the country had few indigenous raw materials other than potash and lignite, it did benefit from CMEA pricing policies, which allowed it to purchase raw materials based on the average world price for the past 5 years.

Industrial production increased by 4.3% to $120 billion,[2] versus a planned 4.6%. The growth was reportedly achieved chiefly through the increases in efficiency and labor productivity. In the metallurgical and steel industries, production had been steadily rising for the past decade, and did so again in 1982. This also applied to the oil, gas, and coal industries. Labor productivity indexes for all of the above categories were reported as also on the rise. On the other hand, the number of workers in the metals and energy industries continued to decline, to 136,828 and 215,091, respectively in 1981, representing 0.8% and 1.3% of total workers, respectively. In 1982, there reportedly were 248,000 workers in the mining and energy industry, or 1.5% of the total.

The GDR in the past several years has concentrated its investments on modernization and retooling rather than new plants, especially in the lignite industry, a trend that will most likely continue in 1983. For example, 16% of the 1982 investments were in robotics, microelectronics and the mechanization of raw materials processing.

Government Policies and Programs.—The 1983 economic plan is to focus on research and development. GDR planners are hoping to shorten the transfer time from initial research to product availability to a maximum of 2 years by emphasizing applied research and providing certain limited material incentives. The development of competitive goods for export through research will be priority. Specialty steels, potash, tin, barite, and fluorite are some of the commodities to be emphasized. The national income is to increase by 4.3% and industrial production is to increase by 3.8%, all with reduced energy and raw materials utilization. The shortage of investment capital and hard currency for imports of capital goods, however, will most likely restrain the economic growth.

In contrast to those of its CMEA partners, the 1981-85 5-year plan for the GDR called for high economic growth targets. To reach these optimistic goals, the GDR has embarked on a program of reducing consumption of raw materials and energy. Economic growth was to be achieved by production of high-quality competitive goods and through rapid application of technological advances.

The plan established a goal for reducing energy consumption by the equivalent of 70 million tons of lignite, or 26% annually. According to the plan, petroleum will be used exclusively as a vehicle fuel and not as

a heating fuel, emphasizing instead lignite as boiler and domestic heating fuel. A production of 295 million tons of lignite was planned for 1985, a 6% increase from the 1982 rate.

The 1981-85 5-year plan, in general, called for further integration and cooperation with the CMEA partners, especially the U.S.S.R. Trade was to be extended also with the developing countries, especially those with which the GDR had close political relations. The plan also called for continued trade with the industrialized West.

PRODUCTION

Almost all official sources claimed that production of minerals increased, despite the ever-present shortage of labor and indigenous raw materials. Increased productivity and reduced consumption were supposedly achieved through the application of scientific and technical progress. The 1982 research and development budget was reported to have been $2.7 billion, which amounted to a high of 4.5% of the national income. About 100,000 employees were directly involved in research and development, about three-quarters of which were in the mineral and energy industry. All production in the GDR was planned and coordinated through a network of combines.

Recovery and reuse of secondary raw materials and scrap was stepped up again, including the collection of discarded bottles and paper. Even the general public was encouraged to participate in scrap collection; 30% of aluminum scrap, for example, was gathered by the public. The collection of zinc scrap rose 13% and aluminum 8% from that of 1981.

Because of the paucity of natural raw materials, and in order to resolve the ever-present labor shortage, the GDR continued to introduce a multitude of robots, flexible manufacturing systems, automatic transfer lines, and manipulators of all sorts into the industry. Contrary to the worldwide recessionary trend, the country's large metalworking industry, and other industrial sectors, were attempting to step up production despite a severe labor shortage, thus moving toward automation.

About 150 robots were in operation in the metallurgical industry and 2,000 were planned for 1985, two-thirds of which, however, were single, specific-process type, instead of the more sophisticated multidirectional programmable equipment. The mechanization was also intended to help the industry improve the quality of its exports through greater precision of the manufacturing processes, while saving on wastage of energy and raw materials. In 1983, according to a 450,000-worker mining and power industry trade union, over 4,600 workers are to be reassigned as a result of the introduction of microelectronic and robot technology.

Table 1.—German Democratic Republic: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Alumina:					
For metallurgical use	37,585	40,965	43,025	45,164	45,000
For other use[e]	19,000	19,000	20,000	20,000	20,000
Metal:[e]					
Primary	65,000	60,000	60,000	60,000	[3]58,000
Secondary	53,500	53,000	52,500	52,000	53,000
Total	118,500	113,000	112,500	112,000	111,000
Cadmium metal, primary[e]	18	15	16	16	[3]16
Copper:					
Mine output, metal content	15,000	14,000	11,800	12,000	13,000
Metal:					
Smelter, primary	16,000	18,000	16,000	16,000	[3]17,000
Refined:[e]					
Primary	31,000	32,000	32,000	32,000	32,000
Secondary	18,000	19,000	19,000	19,000	19,000
Total	49,000	51,000	51,000	51,000	[3]51,000

See footnotes at end of table.

Table 1.—German Democratic Republic: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Iron and steel:					
Iron ore, gross weight marketable, 42% Fe[4] thousand tons	[r]70	[r]56	40	40	40
Metal content of ore do	33	29	20	20	20
Metal:					
Pig iron do	2,560	2,386	2,458	2,441	[3]2,149
Ferroalloys[e] do	164	155	150	150	150
Steel, crude do	6,976	7,023	7,308	7,467	[3]7,168
Semimanufactures (hot-rolled only) do	5,002	5,100	5,128	5,061	[3]5,124
Lead:					
Smelter, primary[e]	20,500	22,000	22,000	22,000	20,000
Refined, all sources	45,000	42,000	42,000	45,000	[3]50,000
Nickel:					
Mine output, metal content, recoverable	2,700	2,500	2,700	2,700	[3]2,500
Metal, refined	3,000	3,000	3,000	2,800	[3]3,000
Silver, mine output, metal content, recoverable thousand troy ounces	1,600	1,550	1,510	1,450	[3]1,450
Tin:					
Mine output, metal content, recoverable	1,600	1,600	1,800	1,600	[3]1,700
Metal, smelter output including secondary[e]	1,750	2,000	2,200	2,300	2,400
Zinc metal including secondary	16,000	17,000	16,500	16,000	[3]17,000
NONMETALS					
Barite[e]	35,000	35,000	35,000	35,000	35,000
Boron materials: Processed borax, $Na_2B_4O_7$ • $10H_2O$ content	4,100	4,200	3,400	4,300	4,200
Cement, hydraulic thousand tons	12,521	12,273	12,440	12,204	12,500
Chalk[e] do	50	50	50	50	50
Clays, kaolin:[e]					
Crude do	370	380	400	400	420
Marketable do	180	190	200	200	210
Fluorspar[e] do	100	100	100	100	100
Gypsum and anhydrite:					
Crude[e] do	350	360	360	360	360
Calcined do	309	319	313	303	305
Lime and dead-burnt dolomite do	3,443	3,470	3,401	3,441	3,500
Nitrogen: N content of ammonia do	1,137	1,078	1,182	1,205	1,200
Potash, marketable, K_2O equivalent do	3,323	3,395	3,422	3,460	3,500
Pyrite, gross weight[e] do	25	25	25	25	25
Salt:					
Marine do	53	55	52	56	55
Rock do	2,688	2,997	3,076	3,056	3,055
Total do	2,741	3,052	3,128	3,112	3,110
Sodium compounds, n.e.s.:					
Caustic soda do	415	548	626	631	630
Sodium carbonate do	852	860	866	878	878
Sodium sulfate do	131	[e]127	[e]127	[e]126	126
Stone, sand and gravel:					
Crushed stone do	14,566	[e]15,000	[e]15,000	[e]15,500	15,000
Sand and gravel do	8,477	9,829	10,353	9,803	9,900
Sulfur:					
Byproduct:[e]					
Elemental do	80	80	80	80	90
Other forms do	270	270	270	270	270
From pyrite[e] do	10	10	10	10	--
Sulfuric acid do	971	952	958	948	950
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous do	115	--	--	--	--
Lignite do	253,264	256,063	258,097	266,734	[3]271,000
Total do	253,379	256,063	258,097	266,734	[3]271,000
Coke:					
From anthracite and bituminous coal[e] do	1,500	1,500	1,500	1,500	1,200
From brown coal:					
High-temperature do	2,297	2,373	2,608	2,612	2,600
Low-temperature do	2,857	2,769	2,727	2,747	2,740
Total do	5,154	5,142	5,335	5,359	5,340

See footnotes at end of table.

Table 1.—German Democratic Republic: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Fuel briquets (from lignite) ___ thousand tons__	48,468	48,698	49,693	49,803	50,230
Gas:					
Manufactured _____ million cubic feet__	218,138	228,380	219,057	209,483	209,000
Natural, marketed production[e] _____ do____	[3]302,426	302,450	302,450	[r]301,000	290,000
Petroleum and refinery products:					
Crude _____ thousand 42-gallon barrels__	392	392	392	444	444
Refinery products:					
Gasoline _____ do____	27,515	27,832	28,333	29,257	29,200
Kerosine, jet fuel, distillate fuel oil do____	42,583	45,329	46,533	46,504	46,500
Residual fuel oil _____ do____	58,941	59,000	59,300	56,610	58,000
Lubricants _____ do____	2,817	2,910	2,894	3,012	3,000
Asphalt _____ do____	6,781	6,969	7,000	7,200	7,000
Total[5] _____ do____	138,637	142,040	144,060	142,583	143,700

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Includes data available through Sept. 23, 1983.

[2]In addition to the commodities listed, magnesium, peat, and a variety of construction materials are produced, but output is not reported, and available information is inadequate to make estimates of output levels.

[3]Reported figure.

[4]Source indicates that data include "roasted ore."

[5]Total of listed products only; no estimates have been made for unreported products or refinery fuel and losses.

TRADE

The GDR's foreign trade continued to decline, and its foreign debt continued to grow. By some accounts, the GDR reduced its debt to Western banks from more than $10 billion in 1981 to less than $9 billion by the third quarter of 1982. The GDR's foreign trade turnover in 1981 was over $40 billion, a 13% increase from that of 1980, but 2% below the plan. Two-thirds of the GDR's trade was with the U.S.S.R. and other CMEA member countries. The U.S.S.R. was again its largest trading partner, and bilateral trade rose 10% compared with 17% in 1981, mainly due to reduced mineral fuel imports. The industrialized Western countries accounted for 25%, and the developing countries accounted for 5% of the GDR's trade. The GDR improved its trade surplus with the Western countries from $49 million to $1.5 billion, while reducing the imported energy products and other raw materials by 60%. Exports to the Federal Republic of Germany (FRG) increased 10% to almost $1.98 billion and imports rose 15% to $1.92 billion.

Table 2.—German Democratic Republic: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	4,001	4,059	--	West Germany 3,170; France 626; Finland 152.
Unwrought	22,962	16,965	--	West Germany 15,698; Japan 1,111.
Semimanufactures	14,582	15,779	82	West Germany 9,580; Hungary 3,562; Poland 1,594.
Cadmium: Metal including alloys, all forms	53	NA		
Chromium: Oxides and hydroxides	25	NA		
Cobalt: Metal including alloys, all forms	20	2	--	All to Netherlands.
Copper:				
Sulfate	(2)	NA		
Ash and residue containing copper	NA	455	--	All to West Germany.
Metal including alloys:				
Scrap	2,760	1,805	--	West Germany 1,470; Belgium-Luxembourg 335.
Unwrought	9,166	8,573	--	West Germany 7,207; Italy 553; United Kingdom 536.
Semimanufactures	19,849	22,236	16	West Germany 22,128; Austria 39.
Gold: Metal including alloys, unwrought and partly wrought, value, thousands	NA	$50	--	All to Sweden.
Iron and steel: Metal:				
Scrap	[3]48,941	22,030	--	West Germany 18,295; Thailand 2,704; Spain 1,000.
Pig iron, cast iron, related materials	29,932	34,413	--	West Germany 21,516; Austria 7,991; Denmark 1,333.
Ferroalloys:				
Ferrosilicon	NA	336	--	France 311; Sweden 25.
Unspecified	6,432	9,034	--	West Germany 7,641; United Kingdom 842; Belgium-Luxembourg 528.
Steel, primary forms[4] thousand tons	344	688	--	West Germany 234; Italy 219; Belgium-Luxembourg 74.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	869	876	--	Poland 66; West Germany 48; undetermined 669.
Universals, plates, sheets do	368	359	(2)	West Germany 104; Italy 44; France 35.
Hoop and strip do	359	393	--	West Germany 28; undetermined 358.
Rails and accessories do	6	14	--	West Germany 7.
Wire do	57	61	--	West Germany 36.
Tubes, pipes, fittings do	138	185	--	Poland 26; West Germany 23; Hungary 20.
Castings and forgings, rough do	83	99	--	West Germany 35; Poland 10; undetermined 54.
Lead:				
Oxides	1,833	7,307	--	Japan 5,025; France 607; West Germany 560.
Metal including alloys:				
Scrap	999	NA		
Unwrought	577	250	--	All to Austria.
Semimanufactures	37	51	--	West Germany 48.
Magnesium: Metal including alloys:				
Scrap	29	46	--	All to West Germany.
Unwrought	--	73	--	All to Belgium-Luxembourg.
Semimanufactures	--	(2)	--	All to Yugoslavia.
Manganese:				
Ore and concentrate, metallurgical-grade	2	NA		
Oxides	18	16	--	All to Sweden.
Metalloids:				
Silicon	NA	1	(2)	All to Yugoslavia.
Unspecified	4	(2)	(2)	
Molybdenum: Metal including alloys, all forms kilograms	200	NA		

See footnotes at end of table.

Table 2.—German Democratic Republic: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel: Metal including alloys:				
Unwrought	106	11	--	All to Netherlands.
Semimanufactures	1	(2)	--	All to Yugoslavia.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified value, thousands	$1,748	$315	--	United Kingdom $293.
Silver:				
Waste and sweepings[5] do	$41	NA		
Metal including alloys, unwrought and partly wrought do	$25,678	$54,054	--	Belgium-Luxembourg $53,696.
Tin: Metal including alloys:				
Unwrought	4	NA		
Semimanufactures	--	17	--	All to Yugoslavia.
Zinc:				
Oxides	425	792	--	West Germany 549; Norway 243.
Metal including alloys:				
Scrap	159	NA		
Unwrought	72	1,886	--	West Germany 1,174; Belgium-Luxembourg 466; Sweden 241.
Semimanufactures	61	(2)	--	All to Denmark.
Other:				
Oxides and hydroxides	974	335	--	All to West Germany.
Ashes and residues	27,236	28,567	--	Austria 18,381; West Germany 10,184.
Base metals including alloys, all forms	2,440	425	--	West Germany 206; Poland 205.
NONMETALS				
Abrasives, n.e.s.:				
Artificial:				
Corundum	3	11	8	All to Hungary.
Silicon carbide	NA	198	--	All to West Germany.
Dust and powder of precious and semi-precious stones, including diamond value, thousands	$1	NA		
Grinding and polishing wheels and stones[6]	593	263	--	Italy 95; Greece 39; United Kingdom 29.
Asbestos, crude	486	NA		
Barite and witherite	9,705	3,168	--	West Germany 2,414; Norway 734.
Boron materials: Oxides and acids	23	NA		
Cement thousand tons	[7]1,226	[7]1,252	--	West Germany 446; Yugoslavia 60; Czechoslovakia 42.
Chalk	[8]43,055	[8]41,042	--	West Germany 11,739; undetermined 29,115.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	717	964	--	All to Austria.
Chamotte earth	494	NA		
Fire clay	1,600	NA		
Kaolin	[8]133,984	[8]115,883	--	West Germany 63,519; Yugoslavia 13,098; Netherlands 11,765.
Unspecified	6,281	23,194	--	West Germany 17,531; Hungary 5,318.
Products:				
Nonrefractory[9]	46,819	8,405	--	United Arab Emirates 1,827; Sweden 1,181; Belgium-Luxembourg 994.
Refractory including nonclay brick	8,174	7,594	--	Hungary 5,222; Sweden 1,222; Finland 361.
Diamond:				
Gem, not set or strung value, thousands	$202	$316	--	Belgium-Luxembourg $314.
Industrial do	$22	$274	--	All to Belgium-Luxembourg.
Feldspar, fluorspar, related materials:				
Fluorspar	NA	47,402	--	West Germany 16,735; Poland 9,636; Norway 9,054.
Unspecified	48,939	1,455	--	Yugoslavia 974; France 457.
Fertilizer materials: Manufactured:				
Ammonia	53,626	24,870	--	Spain 20,997.
Nitrogenous	[10]459,033	795,336	--	West Germany 765,346.
Phosphatic	36,064	7,068	--	Netherlands 6,336.
Potassic, K_2O content[8] thousand tons	2,817	2,860	1	Czechoslovakia 478; Poland 239; Brazil 199.
Unspecified and mixed	1,809	851	--	Belgium-Luxembourg 524; United Arab Emirates 255.

See footnotes at end of table.

Table 2.—German Democratic Republic: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Graphite, natural	50	51	--	Yugoslavia 50.
Gypsum and plaster	[8]78,604	[8]103,009	--	Sweden 68,184; West Germany 24,991.
Halogens:				
Bromine	NA	303	--	All to Hungary.
Unspecified	792	986	--	West Germany 472; Switzerland 429.
Lime	39,248	95,536	--	Hungary 65,096; West Germany 30,440.
Magnesium compounds: Magnesite	530	NA		
Mica:				
Crude including splittings and waste	--	1	--	All to Yugoslavia.
Worked including agglomerated splittings	4	1	--	All to Belgium-Luxembourg.
Nitrates, crude	20	NA		
Phosphates, crude	--	37,127	--	Italy 20,101; Bulgaria 17,000.
Pigments, mineral: Iron oxides and hydroxides, processed	--	348	--	All to Yugoslavia.
Potassium salts, crude	139,810	98,501	--	West Germany 84,733; United Kingdom 10,677.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$10	$6	$6	
Synthetic do.	$17	$3	--	All to Japan.
Pyrite, unroasted	12,725	NA		
Salt and brine[8] thousand tons	1,210	1,272	--	Sweden 79; Hungary 49; Finland 38; undetermined 1,035.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	2,405	1,669	--	Hungary 736; West Germany 419; Austria 243.
Sodium carbonate, natural and manufactured	[8]311,500	[8]373,800	--	Czechoslovakia 58,000; Sweden 35,117; Denmark 27,483.
Sodium hydroxide	[7]137,000	[7]151,000	--	Netherlands 56,584; Sweden 53,185; Finland 19,877.
Sodium sulfate, natural and manufactured	NA	10,425	--	Sweden 9,542; Finland 783.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	17,268	19,312	--	West Germany 17,652; Hungary 881; Norway 479.
Worked	27,013	26,875	--	West Germay 26,468; Netherlands 168.
Gravel and crushed rock	385,296	222,392	--	NA.
Limestone other than dimension	80,154	11,367	--	All to West Germany.
Sand other than metal-bearing	55,176	51,715	--	Hungary 20,952; Yugoslavia 16,924; Austria 6,670.
Sand and gravel[8] thousand tons	2,561	2,388	--	All to West Germany.
Sulfur:				
Elemental:				
Crude including native and by-product	1	NA		
Sulfuric acid	[7]20,500	[7]30,654	--	Czechoslovakia 9,401; Yugoslavia 8,000; Austria 5,094.
Talc, steatite, soapstone, pyrophyllite	21	22	--	United Kingdom 20.
Other:				
Crude	38,783	60,972	--	Denmark 35,490; United Kingdom 7,856; Hungary 4,560.
Slag and dross, not metal-bearing	35,073	67,687	--	Finland 38,689; West Germany 26,371.
Oxides and hydroxides of barium, magnesium, strontium	1,475	1,555	--	Finland 644; Sweden 277; Italy 220.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	6,996	--	Netherlands 6,088; Belgium-Luxembourg 652.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3	(2)	--	All to Canada.
Carbon:				
Carbon black	10,500	4,165	11	Czechoslovakia 1,012; United Kingdom 594; Yugoslavia 536.
Gas carbon	--	280	--	All to Hungary.

See footnotes at end of table.

Table 2.—German Democratic Republic: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite and bituminous	300,366	310,212	--	Poland 300,000; Ireland 5,661; Denmark 2,588.
Briquets of anthracite and bituminous coal	537,493	525,847	--	Hungary 523,792.
Lignite including briquets[8] thousand tons	2,212	2,789	--	West Germany 603; Czechoslovakia 574; Austria 288.
Coke and semicoke	209,067	229,308	--	West Germany 128,617; Spain 60,580; Austria 23,913.
Gas, manufactured[8] million cubic feet	381	445	--	All to Netherlands.
Hydrogen, helium, rare gases	20	45	--	West Germany 38; Yugoslavia 3.
Peat including briquets and litter	124	262	--	West Germany 217; France 21; Netherlands 13.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	--	508	--	West Germany 505
Gasoline do	[8]3,610	[8]3,679	--	West Germany 3,015.
Mineral jelly and wax do	119	79	14	West Germany 24; Austria 10; Yugoslavia 4.
Kerosine and jet fuel do	77	76	--	Hungary 72.
Distillate fuel oil do	[8]8,958	[8]4,743	--	Mainly to West Germany.
Lubricants do	[7]60	[7]76	--	Mainly to Denmark.
Nonlubricating oils do	--	4	--	All to West Germany.
Residual fuel oil do	[7]7,932	[7]18,322	--	West Germany 4,009; Netherlands 2,821; Sweden 1,792.
Bitumen and other residues do	554	481	--	West Germany 479.
Bituminous mixtures do	--	([2])	--	Mainly to Austria.
Petroleum coke do	17	NA		
Unspecified do	211	167	--	Poland 139.
Tars and other crude chemicals derived from coal, gas, and petroleum	93,452	102,990	--	West Germany 88,662; Denmark 1,244; Czechoslovakia 1,012.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by the German Democratic Republic (GDR), this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Less than 1/2 unit.

[3]Excludes imports of Sri Lanka valued at $45,000.

[4]Source for total exports only: Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[5]May include other precious metals.

[6]Excludes quantity valued at $31,000 in 1980 and $324,000 in 1981.

[7]Statistical Yearbook of the Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

[8]Official Trade Statistics of the GDR.

[9]Excludes quantity valued at $15,000 in 1980 and $19,000 in 1981.

[10]Excludes imports of Uruguay valued at $1,078,000.

Table 3.—German Democratic Republic: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	465	2	--	All from Austria.
Aluminum:				
Ore and concentrate[2]	120,600	67,200	--	Hungary 56,600.
Oxides and hydroxides	101,007	98,869	--	West Germany 70,711; Hungary 27,046.
Metal including alloys:				
Scrap	231	372	--	All from West Germany.
Unwrought	49,422	53,889	--	Yugoslavia 34,025; Hungary 19,650.
Semimanufactures	30,039	29,252	([3])	West Germany 14,975; Hungary 8,214; Yugoslavia 5,372.
Antimony: Oxides	NA	276	--	All from France.

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Bismuth: Metal including alloys, all forms	--	8	--	All from Japan.
Chromium:				
Ore and concentrate, Cr_2O_3 content	[2]40,100	[2]49,100	--	Mainly from U.S.S.R.
Oxides and hydroxides	1	([3])	--	All from France.
Cobalt:				
Oxides and hydroxides	--	7	--	All from Netherlands.
Metal including alloys, all forms	189	113	--	All from Finland.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	33	NA		
Copper:				
Ore and concentrate	26,189	19,658	--	Spain 9,583; Norway 4,000; Sweden 3,992.
Ash and residue containing copper	NA	11,751	--	West Germany 10,212.
Metal including alloys:				
Scrap	22,560	23,618	--	West Germany 21,107; Belgium-Luxembourg 980; Switzerland 705.
Unwrought	21,515	40,981	--	Chile 11,000; Peru 8,500;[4] Zambia 7,999.[4]
Semimanufactures	5,344	5,090	--	West Germany 1,784; Belgium-Luxembourg 1,220; Finland 345.
Gold: Waste and sweepings value, thousands	NA	$32	--	All from Sweden.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite, Fe content thousand tons	2,088	2,335	--	U.S.S.R. 1,866; India 407.
Pyrite, roasted	--	1,500	--	All from Italy.
Metal:[5]				
Scrap thousand tons	908	693	--	U.S.S.R. 584; West Germany 107.
Pig iron, cast iron, related materials do.	695	664	--	West Germany 56; undetermined 608.
Ferroalloys, unspecified do.	66	74	--	NA.
Steel, primary forms do.	2,142	2,312	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	646	683	--	U.S.S.R. 269; Czechoslovakia 92; Spain 17.
Universals, plates, sheets do.	731	742	--	U.S.S.R. 512; West Germany 149; Czechoslovakia 34.
Hoop and strip do.	138	138	--	West Germany 12; undetermined 122.
Rails and accessories do.	233	239	--	NA.
Wire do.	28	28	--	West Germany 6; Belgium-Luxembourg 4; undetermined 15.
Tubes, pipes, fittings do.	321	329	--	Poland 29; Czechoslovakia 26; West Germany 23.
Castings and forgings, rough do.	10	13	--	NA.
Lead:				
Ore and concentrate, Pb content	--	[6]2,000	--	NA.
Oxides	21	29	--	Netherlands 18; West Germany 9.
Metal including alloys:				
Scrap	3,162	2,940	--	West Germany 2,028; Belgium-Luxembourg 519; France 199.
Unwrought	613	1,892	--	Belgium-Luxembourg 1,528; Yugoslavia 302.
Semimanufactures	4	NA		
Magnesium: Metal including alloys:				
Unwrought value, thousands	[7]$1,101	$1,227	--	All from Norway.
Semimanufactures	1	NA		
Manganese:				
Ore and concentrate, metallurgical-grade, Mn content	[2]46,600	[2]46,000	--	Mainly from U.S.S.R.
Metal including alloys, all forms	--	49	49	
Mercury 76-pound flasks	8,932	841	--	Italy 812.
Metalloids:				
Selenium	NA	7	--	All from Japan.
Silicon	NA	196	--	Norway 195.
Unspecified	2,276	17,803	--	Italy 15,485; France 2,293.
Molybdenum:				
Ore and concentrate	351	340	--	All from Finland.
Metal including alloys, all forms kilograms	100	NA		

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss	20	NA		
Oxides and hydroxides	NA	44	--	All from France.
Metal including alloys:				
Unwrought	308	80	--	All from Finland.
Semimanufactures	77	110	--	West Germany 95; Switzerland 3.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified value, thousands	$2,588	$2,097	--	West Germany $2,037.
Silver:				
Waste and sweepings[8] do	$40,933	$32	--	All from Sweden.
Metal including alloys, unwrought and partly wrought do	$136,881	$95,114	--	West Germany $89,627; United Kingdom $5,102.
Tin:				
Oxides	--	9	--	All from West Germany.
Metal including alloys:				
Scrap	49	NA		
Unwrought	102	69	--	All from West Germany.
Semimanufactures	--	(3)	--	Do.
Titanium:				
Ore and concentrate	560	778	--	All from Netherlands.
Oxides	22,994	20,419	--	Yugoslavia 10,865; West Germany 5,272; Finland 4,107.
Metal including alloys, all forms	1	NA		
Tungsten:				
Ore and concentrate	--	38	--	Netherlands 26; Sweden 12.
Metal including alloys, all forms	5	5	--	All from Sweden.
Uranium and/or thorium: Metal including alloys, all forms value, thousands	--	$13	--	All from France.
Zinc:				
Ore and concentrate	63,379	49,728	--	West Germany 44,240; Sweden 5,488.
Oxides	212	170	--	France 108; West Germany 62.
Metal including alloys:				
Scrap	595	1,061	--	Denmark 830; Belgium-Luxembourg 131; West Germany 100.
Unwrought	11,950	1,375	--	Finland 1,250.
Semimanufactures	1,154	2,448	--	West Germany 1,812; Norway 440.
Zirconium: Ore and concentrate	1,737	518	--	All from Netherlands.
Other:				
Ores and concentrates	3,928	5,597	--	Norway 5,583.
Oxides and hydroxides	16,572	18,788	--	Sweden 12,944; Austria 4,726; West Germany 1,114.
Ashes and residues	21,330	244	--	West Germany 220; Sweden 20.
Base metals including alloys, all forms	39,002	14,264	--	Yugoslavia 14,259.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	43	49	--	Italy 29; France 20.
Artificial: Corundum	3,484	4,007	--	All from West Germany.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$344	$130	--	All from Netherlands.
Grinding and polishing wheels and stones[9]	236	294	--	West Germany 155; Austria 111.
Asbestos, crude[2]	74,400	50,200	--	NA.
Barite and witherite	1,340	1,291	--	All from West Germany.
Boron materials:				
Crude natural borates	45	3,240	--	All from Netherlands.
Oxides and acids	4,680	5,489	--	All from France.
Cement[10]	5,400	41,900	--	NA.
Chalk	169	214	--	France 199.
Clays and clay products:				
Crude:				
Bentonite	11,004	11,409	--	All from Hungary.
Chamotte earth	832	NA		
Kaolin	15,200	11,200	--	Czechoslovakia 4,000; United Kingdom 1,597.
Unspecified	318	587	--	Netherlands 312; West Germany 264.
Products:				
Nonrefractory	2,805	616	--	Sweden 285; France 212.
Refractory including nonclay brick	17,582	9,435	--	Austria 5,135; United Kingdom 1,751; France 1,197.

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung value, thousands	$218	$13	--	All from Belgium-Luxembourg.
Industrial do	$1,877	$3,485	--	Belgium-Luxembourg $3,359; Switzerland $124.
Diatomite and other infusorial earth	951	1,395	--	West Germany 1,038; France 310.
Feldspar, fluorspar, related materials:				
Feldspar	NA	10,075	--	All from Norway.
Fluorspar	NA	18,636	--	All from Spain.
Unspecified	21,101	13,280	--	Sweden 9,400; Portugal 3,880.
Fertilizer materials: Manufactured:				
Ammonia	2,722	NA		
Nitrogenous, N_2 content[10]	24,900	15,000	--	NA.
Phosphatic, P_2O_5 content[2]	25,400	25,800	--	West Germany 25,704.
Unspecified and mixed	84,277	25,024	--	Austria 25,000.
Graphite, natural	[2]2,632	[2]6,795	--	West Germany 1,360; Austria 1,025.
Gypsum and plaster	409	144	--	Belgium-Luxembourg 72; France 45.
Halogens:				
Chlorine	NA	14,365	--	Sweden 9,869; West Germany 4,496.
Iodine	1	NA		
Unspecified	--	496	--	All from Italy.
Lime	27	NA		
Magnesium compounds:				
Magnesite	47,746	34,741	--	Czechoslovakia 34,221.
Other	NA	2,077	--	Austria 1,998; Netherlands 79.
Mica, all forms[2]	1,424	1,224	--	India 684.
Phosphates, crude, P_2O_5 content[2] thousand tons	534	416	--	U.S.S.R. 394.
Pigments, mineral:				
Natural, crude	--	63	--	All from Austria.
Iron oxides and hydroxides, processed	76	40	--	Italy 20; Belgium-Luxembourg 10; United Kingdom 9.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$406	$21	--	Thailand $19.
Synthetic do	$37	$26	--	Austria $16; Sweden $6.
Pyrite, unroasted	54	NA		
Salt and brine	6	28	--	Sweden 21.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	540	12	--	All from West Germany.
Sodium carbonate, natural and manufactured	81	NA		
Sodium hydroxide	18	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	9,643	8,306	--	Yugoslavia 2,842; Hungary 2,734; Sweden 2,728.
Worked	921	504	--	Yugoslavia 457; Belgium-Luxembourg 39.
Gravel and crushed rock	4,709	667	--	Austria 429; Yugoslavia 162.
Limestone other than dimension	1,219	3	--	All from Sweden.
Quartz and quartzite	696	11,294	--	West Germany 11,214.
Sand other than metal-bearing	234	3,222	--	West Germany 2,121; Sweden 516; Yugoslavia 355.
Sand and gravel	15,177	NA		
Sulfur:				
Elemental, crude including native and byproduct	[2]179,400	167,000	--	All from Poland.
Dioxide	NA	700	--	All from France.
Sulfuric acid[10]	7,600	9,400	--	NA.
Talc, steatite, soapstone, pyrophyllite	2,250	3,372	--	Austria 1,766; West Germany 624; Finland 621.
Other:				
Crude	28,444	30,147	--	Hungary 29,390; West Germany 685.
Slag and dross, not metal-bearing	168	50	--	All from Austria.
Oxides and hydroxides of barium, magnesium, strontium	--	33	--	All from West Germany.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	391	--	Austria 157; Yugoslavia 138; Belgium-Luxembourg 61.

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	178	42	--	Austria 30; Yugoslavia 9.
Carbon: Carbon black	39,526	42,610	--	U.S.S.R. 22,225; West Germany 17,061.
Coal:				
Anthracite and bituminous[2] thousand tons	6,828	5,361	--	U.S.S.R. 2,615; Poland 1,197; West Germany 752.
Lignite including briquets do.	1,562	1,146	--	All from Poland.
Coke and semicoke[2] do.	3,136	2,438	--	U.S.S.R. 1,262; Czechoslovakia 497; West Germany 481.
Gas, natural[2] million cubic feet	227,097	221,247	--	All from U.S.S.R.
Hydrogen, helium, rare gases	1,387	1,573	--	West Germany 1,554.
Peat including briquets and litter	228	528	--	All from West Germany.
Petroleum and refinery products:				
Crude[2] thousand 42-gallon barrels	160,938	167,059	--	U.S.S.R. 139,915.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	12	360	--	France 348.
Gasoline do.	43,257	278,579	--	Finland 257,967; Belgium-Luxembourg 12,036.
Mineral jelly and wax do.	205	79	--	All from Netherlands.
Kerosine and jet fuel do.	57,296	35,216	--	Hungary 20,142; West Germany 9,292.
Distillate fuel oil do.	386,234	137,734	--	Hungary 111,691; Netherlands 24,618.
Lubricants[10] do.	204,400	143,500	--	NA.
Nonlubricating oils do.	--	8,701	--	All from West Germany.
Residual fuel oil[10] do.	219,114	158,508	--	NA.
Bitumen and other residues do.	1,218	588	--	West Germany 248; Austria 242.
Bituminous mixtures do.	406	236	--	France 194.
Petroleum coke do.	131,962	124,432	--	West Germany 121,671.
Unspecified[10] thousand 42-gallon barrels	2,050	2,170	--	NA.
Tars and other crude chemicals derived from coal, gas, and petroleum	36,843	40,640	--	U.S.S.R. 24,926; Sweden 15,602.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by the German Democratic Republic (GDR), this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Official Trade Statistics of the GDR.

[3]Less than 1/2 unit.

[4]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.

[5]Source for total imports only: Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[6]Lead and Zinc Statistics, International Lead and Zinc Study Group, London, United Kingdom.

[7]Excludes exports of 60 tons by France.

[8]May include other precious metals.

[9]Excludes exports valued at $550,000 in 1980 and $643,000 in 1981.

[10]Statistical Yearbook of the Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

COMMODITY REVIEW

METALS

The GDR was deficient in all metals, with minimum mining of indigenous ores. Tin and copper were the only significant metallic minerals mined in the GDR. The collection, recycling, and recovery of secondary materials and metal scrap were the only viable activities in the metallurgical industry. To reduce the import of raw materials, the Government also emphasized the conservation of raw materials and research leading to the development of alternative and substitute materials and substances. In 1982, 5.2 million tons of steel scrap was collected, 70% of which was recycled. In addition, about 46% of lead and 37% of copper scrap were recycled, making the GDR a heavy user of industrial scrap. According to some new accounts, by 1985 about 12% of the country's demand for the principal raw materials is to be met from secondary materials. The Brandenburg steel plant, for example, is to operate a new facility for the conversion of 700,000 tons of open-hearth slag into usable concrete-like

material. The Mansfeld combine at Eisleben was also working on a process to use slag from the copper smelters as a cement additive.

Aluminum.—All of the GDR's requirements for bauxite were imported. Alumina was imported also. Aluminum-bearing silicates however, such as clay and kaolin, were plentiful, and research continued on the production of alumina from domestic clays by hydrochloric and sulfuric acid leaching processes. VEB Mansfeld Kombinat Wilhelm Pieck aluminum plant and the Elektrochemisches Kombinat Lauta Werke alumina plant were said to be involved in other development work, and by some accounts Lauta Werke may have a continuous alumina pilot plant in 1983. The GDR also negotiated a contract with the FRG for the purchase and installation of a small aluminum plant to be located at Nechterstedt light metal works.

Copper.—The GDR continued to mine copper at mines near Sangerhausen, even though the ore was of low grade and difficult to extract and was almost depleted. Domestic mining was on the decline and much of the production came from imported materials and the recovery of scrap, which was imported from various available sources. A large quantity of scrap from the FRG, for example, came under a quota agreement, and more was purchased on the spot market on an as-available basis from other Western countries. The U.S.S.R. continued to supply the GDR with cathodes. The GDR also exported some scrap, and by some accounts, a large portion of the copper, cobalt, and molybdenum regained as a result of the recycling was returned as payment for the scrap.

A new copper smelter and refinery was reportedly under consideration to be built at Eisleben, near Halle, where a 25,000-ton-per-year smelter and a 55,000-ton refinery already exist. A sulfuric acid plant was also to be part of the new construction. The plant was to cost about $250 million, and the Government was seeking assistance from a Finish consortium in its construction.

Iron and Steel.—Domestic iron ore mining was negligible and by some accounts ceased in 1980 owing to depletion of reserves. The ore, pig iron, and scrap were imported mainly from the U.S.S.R. to satisfy domestic demand. About 70% to 75% of the GDR's steelmaking was based on scrap, but the steel combines were unable to meet the scrap collection goal. Reportedly, new measures were taken in the reduction of steel consumption and the collection of scrap. The GDR's steel industry was nevertheless expanding according to plan to achieve self-sufficiency. A steel converter plant was, for example, also under construction at the Eisenhutten Kombinat Ost in Eisenhuttenstadt, which eventually is to employ 1,600 to 2,500 workers, 300 of which are to be women. New specialty steel was reportedly being produced at the Delitzsch Kombinat near Leipzig, and VEB Stahl-und Walzwerk Brandenburg operated its new automated rolling mill for the continuous production of rods directly from ingots. Thus, even though the output of steel and pig iron fell, the steel industry as a whole registered a modest growth. This was achieved through the output of higher quality and specialty products, which brought higher prices. The net production of steel reportedly amounted to $24 billion. As part of its policy, the GDR purchased the most up-to-date equipment from Western countries and was planning to modernize its oxygen steelmaking capacity in the near future, whose share in total crude steel production declined to 8%.

Lead and Zinc.—Production was from domestic and imported scrap. Lead scrap was imported from all available sources, the United States and the FRG being the major suppliers; zinc scrap came mostly from the FRG and France. Some ore and concentrate were also imported.

Tin.—Tin, in the form of cassiterite occurring in the Erzgebirge along the country's southeastern border, is one of the few relatively abundant metallic ores in the GDR. By some estimates, both the domestic mine output and the production of metal were on the increase, primarily because of improvements in mining and production technologies. Although the GDR's tin deposits are low grade, reportedly they are large enough to meet the planned increased production. Reportedly, several mines and processing plants have modernized their facilities for more efficient operation. The mining and smelting of ore was carried out by the Albert Funk Mining and Metallurgical Combine in Freiberg, the largest tin smelter in the GDR. Semifinished tin products and concentrate were also imported from market economy countries and the U.S.S.R. to satisfy the growing domestic demand.

NONMETALS

The nonmetals mining and processing industry of the GDR was better off than the metals industry. The country had plentiful supplies of kaolin, potash, rock salt, barite, chalk, and natural building materials. Most of these ores were also mined and processed for export. Barite and fluorite, for example, mined around the Thuringian Forest and the Harz Mountains, were exported. Cement was produced from the plentiful limestone deposits, with various quarries and over 30 plants located throughout the country. The abundant chalk deposits on Rugen Island were the largest in Europe, and were mined by the only company, the VEG Kreidewerke Rugen, located on the island near Sassnitz. Quartz sand, kaolin (china clay), and other clays were also in abundant supply, and kaolin and bentonite were exported mainly for the manufacture of porcelain and industrial ceramics.

Potash.—Potash K_2O output continued its steady rise, and the GDR was the world's third largest producer. VEB Kombinat Kali managed all four combines, producing over 12% of the world total. The GDR was also the third largest exporter of potash, exporting over 80% of production, 43% of which was shipped to CMEA member countries.

Western Europe was the GDR's second largest market area for potash, and despite the continuing recession in the West, sales to this area increased slightly. Great Britain was the GDR's largest Western European importer; long-term potash sales agreements have existed between the two countries for over two decades.

Identified potash reserves were estimated at 300 to 900 million tons of K_2O, and total reserves were extimated at 5 to 7 billion tons. The ore occurs in the Zechstein Formation of Upper Permian Age and the region in the GDR stretches from the Magdeburg in the north to Suhl at the southwest border.

The GDR potash industry produced, in addition to 60% K_2O equivalent potassium chloride, a lower K_2O equivalent, and other potash salts such as "Kamex" with 40% K_2O and 10% magnesium sulfate fertilizer, "Kainit" fertilizer with 13% K_2O equivalent and 20% $MgSO_4$, and potassium sulfate with 50% K_2O equivalent. Another important recent development has been the expansion of the granulation capacity, achieved through the construction of a compaction unit at the Zielitz Mine.

The GDR did not plan to increase the production of potash significantly over the next few years, although production will most likely increase eventually. Many of the mines were old and required renovation and extension of the underground workings. In addition, improvements in the quality of the standard- and granular-grade products continued to be made. Over the next few years, potassium sulfate production is to increase at the Dorndorf plant to about 140,000 tons of K_2O equivalent annually. Some of the increased production is to be directed to the CMEA countries who until now had to import potassium sulfate from West European producers.

MINERAL FUELS

Except for lignite, the GDR depended on imports for all mineral fuels. About 300 commercial power and heating plants and 21,000 industrial furnaces were all essentially run on lignite. The first lignite liquefaction plant was in the planning stages, and will process approximately 10 million tons of lignite annually. The use of nuclear power increased from 8.4% of total in 1976 to about 12% of the present total, and was planned to rise to 14% by 1985.

The GDR continued to increase electrical energy production, which reached 21,367 megawatts in 1981. Sources of the electrical energy for 1980-81 are summarized in the following tabulation:

Source	Million kilowatt hours	
	1980	1981
Brown coal and lignite	77,178	79,910
Brown coal briquets	575	523
Hard coal	447	285
Nuclear fuel	11,889	11,902
Hydroelectric plants	1,658	1,736
Liquid fuels	1,221	926
Other	5,840	5,438
Total	98,808	100,720

Conservation of mineral fuels and energy was of primary concern to the Government, and as in previous years was part of the annual plan. Consumption during 1982 of all fuels except lignite declined, 25% for heating oil, 30% for gasoline, 13% for diesel fuel, 11% for hard coal, and 3% for brown coal briquets. The conservation program was supplemented by the increased usage of domestic natural gas, lignite, and unprocessed brown coal.

Coal.—Lignite production reached its highest level. Domestic lignite continued to

replace imported oil, necessitating high expenditures for plant conversions and future costs for environmental protection. Lignite supplied almost 70% of total energy requirements, from which was produced more than 80% of the electricity, a large quantity of briquets, high- and low-temperature coke, and manufactured gas. An essential portion of the country's capital investment was allocated to the development and maintenance of the lignite industry. VEB Braunkohlen-Kombinat Senftenberg produced almost two-thirds of the country's lignite. There were 34 surface lignite mines, most located in the eastern Elbe Field. About 40% of the lignite was used by heating plants and another 40% was used by briquet factories. Most of the coal briquets were produced for domestic consumption and only 5% were exported. Domestic production of hard coal ceased in 1978, owing to depletion of deposits. Almost 1.25 million tons of coke was produced domestically from imported hard coal, and another 2.1 million tons of coke was imported.

As more lignite was mined, more overburden had to be removed to get to the seams. In large surface mining operations the overburden was stripped and transported by huge excavators, conveyor belts, and dumping machines capable of removing 200,000 cubic meters of overburden per day, reportedly 20% more than the rated capacity. The ratio of overburden to coal was 4.3:1. To move overburden more effeciently, Senftenberg installed four robots to operate the conveyors and three more were planned for 1983. Reportedly, each robot did the work of five people. At the Welzow South Mine, a 3-mile-long conveyor belt was installed, totally controlled by microelectronics and television monitoring systems. This mine was reportedly able to produce almost 10% of the GDR's total lignite output and moved 180,000 cubic meters of overburden daily. During the 1981-85 5-year plan, 152 of the excavators are to be redesigned for self-propulsion to move from mined-out areas. Secondary materials were recovered simultaneously from the overburden; reportedly 4 million tons of sand and gravel, 3.5 million tons of clay, and 88,000 tons of foundry sand were thus conserved and stockpiled.

Natural Gas and Petroleum.—Natural gas and petroleum resources were extremely limited, and over 90% of total natural gas and petroleum requirements were imported. The GDR continued to rely on the U.S.S.R. for 80% to 85% of its oil requirements. Conservation of oil and gas and reliance on alternative energy sources, such as nuclear power, were emphasized by the Government. Natural gas reserves were small and were estimated at 2.3 trillion cubic feet, having a life expectancy of only 8 years and presenting about 0.1% of world reserves.

Exploration in the northern part of the country continued and drilling was to start in the GDR's portion of the Baltic Sea. There were several unconfirmed reports of small onshore discoveries along the Baltic coast. Potential oil reserves were as yet unknown.

The GDR signed an agreement with the U.S.S.R. for the import of about 125 million barrels of crude in 1982, which was 10% less than in the last 2 years. The 1983 imports were planned to be even less because of the increased sales of oil by the U.S.S.R. to the industrialized West and reduced deliveries to CMEA countries. Other sources attributed lower deliveries to the GDR's difficulty in paying for previous crude deliveries. Reportedly, the deliveries of gas were not affected. Most of the oil was delivered by rail to the Schwedt petrochemical combine at Schwedt-am-Oder because the Rostock-Schwedt pipeline had been converted to the transport of diesel fuel in the opposite direction.

Nuclear Power.—The development of nuclear energy in the GDR was closely tied to the U.S.S.R., which provided the enriched nuclear fuel, reactor assembly, and some technical assistance. There were four nuclear powerplants with a total capacity of over 2,800 megawatts and another 3,520 megawatts were in the planning stage, to be located at the Bruno Leuschner plant in Lubin on the Baltic coast. Other plants were located near Rheinsberg, Stendal, and Nord. About 11% of the country's electricity was produced by nuclear powerplants. Reportedly, by 1985 nuclear power was to contribute 12% to 14% of the country's total electricity requirements.

There was some mining of uranium, but all of it was exported to the U.S.S.R. for processing and eventual reimport of the enriched nuclear fuel.

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[1]Physical scientist, Division of Foreign Data.

[2]The GDR mark (M) is a nonconvertible currency officially fixed at 1:1 with the West German deutsche mark (DM). Western banks, however, exchange the currencies at the rate of 4M-5M=1DM. The GDR mark's relation to the U.S. dollar is based upon the fluctuation of the dollar-DM ratio. Foreign trade figures are denoted in an accounting unit known as the valuta mark (VM). The rate of valuta marks converted to U.S. dollars in 1982 was taken as VM3.34=US$1.00.

The Mineral Industry of the Federal Republic of Germany

By George A. Rabchevsky[1]

The overall economy of the Federal Republic of Germany (FRG) continued the decline that began last year. This was also reflected in the mineral industry, especially in metals production. In nonmetals, such as potash, the stagnation in production and company profits was mostly due to low demand at home and abroad. Rising costs of coke, energy, maintenance, environmental controls on one hand, and falling commodity prices and overcapacity on the other, contributed to the already weakened mineral industry. Metallgesellschaft AG, for example, an industrial giant in the FRG with extensive holdings in mining and minerals processing, was unable in 1982 to pay its shareholders a dividend for the first time in more than 30 years.

The gross national product (GNP) fell by 1.2% in real terms to $653 billion.[2] For the first time in the history of the FRG, the total of all goods and services produced fell in 2 consecutive years. In the steel industry, this was partly due to the cutting of production capacities demanded by the European Economic Community, which included fines for overproduction. Almost 16,000 enterprises went bankrupt, nearly 40% more than in 1981. General unemployment rose from 5.5% to a record of 7.5%, with more than 2 million unemployed. In both the ferrous and nonferrous metals industry, unemployment was high. Wage increases averaged a moderate 3%; I.G. Metall, the largest industrial trade union, with 2.6 million members, tentatively agreed on a 3.2% wage increase in 1982 for 3.6 million workers, which included the metal industry.

PRODUCTION

By the end of 1982, industrial production was approximately 5% below that of 1981. The steel, construction, and gas pipeline industries recorded losses of 10%, as did the minerals energy and nonferrous minerals producing sectors. Production and processing of almost all minerals, including oil and gas, declined during the year.

The FRG continued, however, to be one of the world's major producers, processors, and consumers of minerals and metals. It was a large producer of iron and steel, coal, and lignite. Although there was a plentiful supply of potash and salt, the country is not rich in metallic ore deposits. Much of the metal raw material base had to be imported to maintain the processing industry.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite, gross weight	280	349	264	79	(4)
Alumina thousand tons	1,556	1,539	1,608	1,651	[2]1,565
Metal:					
Primary do	740	741	731	729	[2]723
Secondary:					
Alloyed do	368	381	368	354	350
Unalloyed do	47	45	40	41	40
Bismuth:					
Ore and concentrate[e]	9	10	--	--	--
Metal, smelter[e]	600	661	--	--	--
Cadmium metal, smelter	1,182	1,266	1,197	1,192	1,190
Cobalt metal, smelter[e]	350	385	400	400	400
Copper:					
Mine output, metal content	821	861	1,274	1,429	[2]1,303
Metal:					
Blister and anodes:					
Primary	165,800	158,200	153,900	163,100	[2]148,000
Secondary	55,700	92,500	103,900	88,300	92,000
Total	221,500	250,700	257,800	251,400	[2]240,000
Refined including secondary:					
Electrolytic	318,551	303,122	302,516	304,068	[2]313,648
Fired refined	84,881	79,396	71,483	83,303	[2]80,344
Total	403,432	382,518	373,999	387,371	[2]393,992
Gold:					
Mine output, metal content troy ounces	2,119	2,357	2,964	3,051	3,000
Metal including secondary do	336,264	293,857	298,873	298,873	299,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	1,597	1,649	1,948	1,575	[2]1,318
Iron content do	510	526	597	477	450
Metal:					
Pig iron do	[r]30,148	[r]35,167	33,873	31,876	[2]27,400
Blast furnace ferromanganese and spiegeleisen do	209	233	200	206	200
Blast furnace ferrosilicon do	78	79	64	50	50
Electric furnace ferroalloys do	139	195	182	154	155
Steel, crude do	41,253	46,040	43,838	41,610	[2]36,000
Semimanufactures do	30,198	32,813	31,661	30,850	[2]25,800
Lead:					
Mine output, metal content	23,181	[r]25,223	23,063	21,605	21,000
Metal:					
Smelter:					
Primary	105,212	103,374	111,891	107,493	[2]110,706
Secondary	199,828	213,186	189,458	254,824	[2]256,348
Total	305,040	316,560	301,349	362,317	[2]367,054
Refined:					
Primary	189,900	194,800	191,100	189,500	[2]190,300
Secondary	179,100	178,500	159,200	158,800	[2]158,000
Total	369,000	373,300	350,300	348,300	[2]348,300
Magnesium metal including alloys:					
Unwrought (secondary only)[e]	600	600	600	600	600
Castings	16,359	15,999	15,102	[e]15,000	15,000
Mercury (secondary only) 76-pound flasks	2,437	2,639	1,624	2,205	2,200
Nickel metal including secondary[3]	901	1,223	1,235	[e]1,200	1,200
Platinum troy ounces	2,572	[e]2,400	[e]2,411	[e]2,411	2,420
Silver:					
Mine output, metal content thousand troy ounces	799	1,039	1,058	1,126	[2]1,263
Metal including secondary do	18,085	16,291	24,371	21,126	21,000
Tin metal including secondary	4,767	4,096	2,262	1,815	[2]2,900
Tungsten metal	[e]1,500	NA	NA	NA	NA
Zinc:					
Mine output, metal content, recoverable	97,405	96,853	99,720	91,779	[2]86,920
Metal, unwrought, unalloyed:					
Primary	288,679	333,665	342,797	331,199	300,000
Secondary	18,157	21,858	27,849	35,357	35,100
Total	306,836	355,523	370,646	366,556	[2]335,100

See footnotes at end of table.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS					
Abrasives: Artificial corundum	96,737	102,212	102,222	97,026	[2]83,385
Barite	168,586	161,661	175,380	177,000	[2]186,000
Bromine	3,893	4,020	[e]4,000	[e]4,000	4,000
Cement and clinker:					
Cement (excluding clinker) thousand tons	33,959	35,287	34,258	30,011	32,000
Clinker do	1,344	1,377	1,360	1,364	[2]1,029
Clays:					
Fire clay (exclusive of klebsand) do	5,224	5,635	5,791	5,478	5,500
Kaolin, marketable do	521	556	502	475	[2]530
Bleaching do	621	639	638	625	620
Other (schieferton) do	128	124	152	131	130
Diatomite and similar earth, marketable	47,600	43,271	52,824	42,373	43,000
Feldspar, marketable	385,590	372,754	380,880	380,000	[2]375,000
Fluorspar, marketable:					
Acid-grade	68,150	56,855	70,337	64,627	[2]64,800
Metallurgical-grade	7,572	6,317	7,815	7,181	7,200
Total	75,722	63,172	78,152	71,808	72,000
Graphite:					
Crude	12,763	7,342	11,375	16,372	[2]13,000
Marketable[e]	6,381	3,671	5,688	8,186	8,000
Gypsum and anhydrite, marketable thousand tons	2,238	2,251	2,250	2,250	[2]2,365
Lime (hydrated), quicklime, dead-burned dolomite do	8,990	[r]9,238	8,575	7,900	8,000
Nitrogen: N content of ammonia do	1,955	2,161	2,044	1,962	1,700
Phosphates:					
Thomas slag-based fertilizer, P_2O_5 content do	150	145	161	138	135
Pigments, mineral, natural	21,475	28,561	24,069	22,524	23,000
Potash, K_2O equivalent:					
Crude, marketable thousand tons	72	74	76	72	72
Chemically processed do	2,398	2,542	2,661	2,519	2,528
Total do	2,470	2,616	2,737	2,591	2,600
Pumice:					
Crude and washed do	3,522	2,640	2,102	1,253	1,200
Marketable do	2,087	1,432	807	399	350
Pyrites, marketable concentrate, gross weight do	502	460	502	483	480
Quartz, quartzite, glass sand:					
Quartzite do	411	426	454	395	[2]455
Quartz sand, ground do	421	454	453	422	[2]378
Quartz sand, unground and glass sand do	7,026	7,417	7,475	7,018	[2]5,970
Salt, marketable:					
Rock do	6,846	8,960	6,759	8,367	7,000
Marine and other do	5,812	6,130	4,637	4,174	4,500
Sodium compounds:					
Sodium carbonate	1,229,722	1,400,922	1,411,110	1,189,112	1,200,000
Sodium sulfate	211,000	[r]210,664	225,234	254,848	250,000
Stone, sand and gravel, n.e.s.:					
Dimension stone thousand cubic meters	307	311	264	324	[2]324
Limestone, industrial thousand tons	50,995	54,521	53,477	49,243	[2]49,935
Crushed and broken stone do	118,096	126,463	117,616	99,149	[2]61,458
Slate do	3	4	6	5	5
Basalt lava and lava sand do	7,047	8,056	8,153	7,784	7,700
Calcite do	12	8	5	3	4
Grinding stone cubic meters	238	71	43	42	40
Tuff thousand tons	3	3	4	3	3
Sand and gravel do	184,786	198,637	188,155	164,437	[2]150,036
Sulfur:					
S content of pyrites do	221	203	222	213	200
Byproduct:					
Of metallurgy do	380	450	450	[e]400	400
Of natural gas do	650	690	814	834	900
Of petroleum do	190	[r]213	220	[e]200	185
Unspecified do	160	93	[e]93	[e]95	100
Total do	1,601	1,649	1,799	1,742	1,785
Talc including talc schist do	15	15	15	15	15

See footnotes at end of table.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	297,509	340,629	353,568	354,191	[2]348,037
Coal:					
Anthracite thousand tons	6,942	7,018	87,146	88,460	[2]89,014
Bituminous do	76,994	79,301			
Lignite do	123,559	130,579	129,833	130,619	[2]127,307
Total do	207,495	216,898	216,979	219,079	[2]216,321
Coke:					
Metallurgical do	25,455	26,501	28,494	27,914	[2]26,275
Gashouse do	782	937	[e]900	--	--
Total do	26,237	27,438	29,394	27,914	[2]26,275
Fuel briquets:					
Of anthracite and bituminous coal do	1,453	1,673	1,455	1,332	[2]1,285
Of lignite do	3,889	4,752	4,446	4,169	[2]3,951
Gas:					
Manufactured (excluding that from petroleum refineries):					
Blast furnace million cubic feet	179,857	212,629	199,456	185,752	[2]153,545
Coke oven do	205,848	214,324	226,336	227,246	[2]214,144
Other do	72,818	52,760	[e]53,000	[e]53,000	53,000
Total do	458,523	479,713	[e]478,792	[e]465,998	420,689
Natural:					
Gross do	738,002	743,900	658,430	673,014	[2]568,909
Marketable do	707,156	[e]725,000	[e]665,000	665,942	512,000
Peat:					
Agricultural use thousand tons	2,047	1,849	1,555	1,742	[2]1,835
Fuel use do	228	230	279	246	[2]253
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	36,541	34,482	33,450	31,213	[2]31,062
Refinery products:					
Gasoline, motor do	127,069	182,800	182,296	170,204	[2]173,009
Jet fuel (including aviation gasoline) do	10,620	10,345	10,506	11,680	[2]8,168
Kerosine do	334	523	315	357	[2]388
Distillate fuel oil do	292,020	345,621	311,192	270,977	[2]264,823
Residual fuel oil do	160,047	146,333	128,509	143,037	[2]127,852
Lubricants do	6,653	9,660	9,080	9,716	9,500
Other:					
Liquefied petroleum gas do	37,932	36,669	30,938	26,425	[2]26,262
Bitumen do	22,866	23,756	20,406	18,653	16,000
Unspecified do	[e]76,555	97,846	89,758	94,395	92,000
Refinery fuel and losses do	54,362	99,807	91,557	[e]50,000	15,000
Total do	788,458	953,360	874,557	795,444	733,002

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 12, 1983.
[2]Reported figure.
[3]Preliminary nickel and nickel contained in ferronickel, Monel metal, and nickel oxide directly used by the steel industry.

TRADE

The economy continued to rely heavily on foreign trade, and falling exports in the FRG were to some degree responsible for the decline of overall economic production. For 1982 as a whole, export orders for almost all commodities were down 18%. After an increase in 1981, the volume of exports declined 10%, even though there was a large trade surplus of $21 billion. Traditionally, export revenues have amounted to about 25% of the GNP and have often led the country out of recession. Trade with the German Democratic Republic rose at the high rate of 13%, above all other Council of Mutual Economic Assistance (CMEA) member countries, and rose by 5% with market economy countries. Excluding trade with the German Democratic Republic and the Soviet Union, the FRG's trade with other CMEA countries and China fell by 4%.

Table 2.—Federal Republic of Germany: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Cesium and rubidium ____value__	$35,759	$28,256	NA	NA.
Lithium:				
Oxides and hydroxides _____	859	490	NA	France 202; United Kingdom 116; Belgium-Luxembourg 73.
Metal including alloys, all forms _	23	19	NA	Switzerland 10; France 6; United Kingdom 2.
Rare-earth metals _____	157	147	NA	NA.
Unspecified _____	28	45	21	Italy 19; Japan 3.
Aluminum:				
Ore and concentrate _____	22,645	22,885	__	France 6,695; Belgium-Luxembourg 6,690; Finland 2,800.
Oxides and hydroxides _____	478,937	582,613	7,988	Poland 109,824; East Germany 74,436; Sweden 73,178.
Ash and residue containing aluminum	11,247	10,577	NA	France 5,357; Netherlands 2,984; Italy 1,643.
Metal including alloys:				
Scrap _____	69,144	69,922	28	Italy 23,567; Netherlands 17,328; France 15,281.
Unwrought _____	223,680	252,970	9,569	France 58,429; Italy 43,081; Belgium-Luxembourg 35,576.
Semimanufactures _____	385,544	405,194	6,606	France 76,765; United Kingdom 48,835; Italy 35,490.
Antimony:				
Oxides _____	261	481	20	Taiwan 78; Belgium-Luxembourg 77; Italy 64.
Metal including alloys, all forms ___	47	102	NA	Iran 80.
Beryllium:				
Oxides and hydroxides ____value__	$1,692	$7,506	NA	NA.
Metal including alloys, all forms kilograms__	58	618	NA	NA.
Bismuth: Metal including alloys, all forms _____	316	328	35	Yugoslavia 117; United Kingdom 49; Spain 35.
Cadmium:				
Oxides and hydroxides _____	28	38	NA	Netherlands 19.
Metal including alloys, all forms ___	300	604	NA	NA.
Chromium:				
Ore and concentrate _____	5,412	3,459	__	Denmark 993; France 910; Austria 680.
Oxides and hydroxides _____	49,744	46,106	NA	NA.
Metal including alloys, all forms ___	275	164	21	Belgium-Luxembourg 45; Switzerland 27; Italy 11.
Cobalt:				
Oxides and hydroxides _____	88	54	__	Italy 14; Belgium-Luxembourg 11; Czechoslovakia 10.
Metal including alloys, all forms ___	821	619	2	France 25; Romania 14; Switzerland 10; unspecified 516.
Columbium and tantalum:				
Ore and concentrate _____	2,210	1,862	1,213	Netherlands 403; Belgium-Luxembourg 215; United Kingdom 14.
Ash and residue containing columbium and/or tantalum _____	NA	917	NA	Belgium-Luxembourg 892.
Metal including alloys, all forms:				
Columbium (niobium) _____	90	50	NA	NA.
Tantalum _____	97	42	NA	NA.
Copper:				
Ore and concentrate _____	8	2	__	All to France.
Matte and speiss including cement copper _____	617	282	NA	Belgium-Luxembourg 205.
Oxides and hydroxides _____	2,174	2,967	357	Denmark 455; United Kingdom 370; Netherlands 182.
Sulfate _____	943	1,645	NA	NA.
Ash and residue containing copper __	r13,826	15,731	NA	Austria 7,645; Belgium-Luxembourg 4,018; Netherlands 1,700.
Metal including alloys:				
Scrap _____	86,810	88,881	190	East Germany 21,107; Netherlands 16,948; Italy 16,083.
Unwrought _____	115,314	95,233	520	United Kingdom 28,255; France 9,099; Sweden 9,097.
Semimanufactures _____	353,785	388,983	49,454	France 43,509; Netherlands 38,465; Switzerland 34,301.
Gallium: Metal including alloys, all forms kilograms__	4,200	4,400	400	Japan 2,100; United Kingdom 700; Netherlands 300.
Germanium: Metal including alloys, all forms _____ value, thousands__	$487	$387	$72	North Korea $137; United Kingdom $97; Netherlands $56.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Gold:				
Ash and residue containing gold value	$53,914	$97,572	NA	NA.
Waste and sweepings value, thousands	$2,760	$4,131	NA	Switzerland $3,430; Netherlands $602; Spain $59.
Metal including alloys, unwrought and partly wrought thousand troy ounces	882	1,033	8	United Kingdom 276; Belgium-Luxembourg 157; Switzerland 125.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	156,829	76,826	--	Belgium-Luxembourg 57,273; France 7,914; Austria 6,210.
Pyrite, roasted	4,467	6,538	--	Switzerland 2,902; Austria 1,477; East Germany 840.
Metal:				
Scrap thousand tons	3,174	3,514	(1)	Italy 2,399; Belgium-Luxembourg 380; France 119.
Pig iron, cast iron, related materials do	1,077	928	(1)	France 380; Italy 104; Spain 53.
Ferroalloys:				
Ferrochromium	33,524	55,674	4,573	France 25,095; Italy 5,161; Belgium-Luxembourg 4,617.
Ferromanganese	36,762	48,876	4,023	Belgium-Luxembourg 9,328; Italy 8,540; France 4,959.
Ferromolybdenum	1,227	912	NA	Netherlands 252; Belgium-Luxembourg 153; France 112.
Ferronickel	86	555	44	Austria 377; Netherlands 80; Belgium-Luxembourg 21.
Ferrosilicochromium	1,417	1,179	NA	Belgium-Luxembourg 696; France 202; Italy 182.
Ferrosilicomanganese	5,598	7,832	NA	Switzerland 2,853; Italy 1,934; Netherlands 864.
Ferrosilicon	55,714	60,956	400	Belgium-Luxembourg 12,742; France 12,358; Italy 6,604.
Unspecified	12,575	15,820	1,810	Austria 1,537; Romania 1,528; France 1,137.
Steel, primary forms thousand tons	3,722	3,453	325	France 414; Italy 356; United Kingdom 321.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	3,788	3,380	177	France 620; Netherlands 420; Belgium-Luxembourg 242.
Universals, plates, sheets do	6,750	6,519	648	U.S.S.R. 935; France 728; India 384.
Hoop and strip do	1,529	1,462	37	U.S.S.R. 240; France 170; Netherlands 130.
Rails and accessories	219,000	300,131	73,266	Italy 55,010; Netherlands 45,586d Mexico 25,296.
Wire	334,000	310,342	15,748	France 53,369d Netherlands 47,411; Belgium-Luxembourg 33,262.
Tubes, pipes, fittings thousand tons	3,191	4,175	836	U.S.S.R. 718; Netherlands 399; Mexico 240.
Castings and forgings, rough	121,000	116,816	5,113	France 17,991; Belgium-Luxembourg 14,552; Netherlands 14,200.
Lead:				
Ore and concentrate	2,000	300	--	All to Sweden.
Oxides	11,810	15,893	63	Netherlands 3,267; U.S.S.R. 2,890; Italy 2,499.
Ash and residue containing lead	12,101	10,916	NA	Belgium-Luxembourg 5,559; Netherlands 4,098; United Kingdom 639.
Metal including alloys:				
Scrap	20,041	18,550	--	Netherlands 6,800; Italy 3,269; Denmark 3,069.
Unwrought	98,780	96,361	2,501	Italy 40,191; Austria 16,434; France 10,631.
Semimanufactures	18,254	14,928	49	Denmark 3,120; Belgium-Luxembourg 1,559; Switzerland 1,391.
Magnesium:				
Metal including alloys:				
Scrap	2,123	1,774	282	Italy 812; Netherlands 411; Brazil 73.
Unwrought	149	198	--	Austria 79; Belgium-Luxembourg 54; France 27.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Magnesium —Continued				
Metal including alloys —Continued				
Semimanufactures	494	857	3	Netherlands 193; Austria 107; Sweden 98.
Manganese:				
Ore and concentrate, metallurgical-grade	1,405	2,174	--	Belgium-Luxembourg 967; France 845; Denmark 101.
Oxides	4,318	355	NA	NA.
Metal including alloys, all forms	123	43	NA	Bulgaria 4; United Kingdom 3; Switzerland 2.
Mercury 76-pound flasks	6,370	3,973	NA	Netherlands 995; Switzerland 510; Austria 368.
Metalloids:				
Arsenic:				
Oxides and acids	1,010	967	116	United Kingdom 562; Yugoslavia 22.
Boron including alloys, all forms kilograms	3,300	3,600	800	France 1,500; Japan 600; Sweden 500.
Phosphorus and selenium	12,073	7,800	29	France 2,734; Denmark 1,683; Netherlands 513.
Silicon	4,094	4,881	418	France 2,720; Italy 447; Netherlands 387.
Tellurium and arsenic	4	21	NA	Yugoslavia 4; United Kingdom 2; Brazil 1.
Molybdenum:				
Ore and concentrate	6,984	5,428	541	Belgium-Luxembourg 2,017; Netherlands 814; Austria 681.
Oxides and hydroxides	2,502	2,480	NA	NA.
Metal including alloys:				
Semimanufactures	52	46	(1)	Japan 12; Brazil 7; Iran 5.
Unspecified	435	273	NA	NA.
Nickel:				
Matte and speiss	302	52	--	Belgium-Luxembourg 32; Netherlands 20.
Oxides and hydroxides	135	95	13	Spain 22; Greece 10; Italy 10.
Ash and residue containing nickel	2,152	1,692	NA	Austria 562; Netherlands 380; Sweden 373.
Metal including alloys:				
Scrap	5,317	7,779	196	Sweden 5,453; Netherlands 632; India 308.
Unwrought	6,436	4,520	73	France 2,790; Netherlands 735; Austria 277.
Semimanufactures	11,728	10,243	2,459	United Kingdom 1,963; France 833; Belgium-Luxembourg 711.
Platinum-group metals:				
Ash and residue value	$84,172	$8,830	NA	NA.
Waste and sweepings value, thousands	$2,150	$990	NA	Netherlands $547; Belgium-Luxembourg $311; Switzerland $112.
Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	105,045	94,544	3,336	Switzerland 24,293; Netherlands 22,258; Japan 16,850.
Platinum do	279,037	238,912	897	Switzerland 20,632; Japan 17,458; Netherlands 15,959.
Unspecified do	84,344	101,497	971	East Germany 26,460; Japan 15,718; Hong Kong 12,644.
Rhenium: Metal including alloys, all forms value	$15,404	$45,475	NA	NA.
Silver:				
Ash and residue containing silver value, thousands	$2,729	$2,463	NA	France $1,242; Switzerland $512; Belgium-Luxembourg $412.
Waste and sweepings do	$3,960	$20,343	NA	Austria $19,085; Spain $865; Switzerland $315.
Metal including alloys, unwrought and partly wrought thousand troy ounces	64,706	33,519	631	Switzerland 6,772; Sweden 3,681; United Kingdom 2,562.
Tin:				
Ore and concentrate value	--	$1,325	--	All to France.
Ash and residue containing tin	5,247	5,122	NA	United Kingdom 4,617; Netherlands 195; Spain 182.
Metal including alloys:				
Scrap	107	106	--	Netherlands 56; United Kingdom 24; Denmark 19.
Unwrought	3,241	4,785	198	Netherlands 3,301; United Kingdom 339; Belgium-Luxembourg 151.
Semimanufactures	788	722	(1)	Austria 119; Switzerland 78; unspecified 280.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	9,262	8,731	1,500	Netherlands 2,340; United Kingdom 1,791; France 661.
Oxides	50,635	52,189	9,312	East Germany 5,272; Italy 4,336; Netherlands 3,246.
Metal including alloys, all forms	2,234	2,132	210	United Kingdom 707; Austria 256; Sweden 234.
Tungsten:				
Ore and concentrate	139	182	--	United Kingdom 117; Netherlands 50; U.S.S.R. 15.
Ash and residue containing tungsten	100	167	NA	Austria 126; United Kingdom 32.
Metal including alloys:				
Scrap	NA	496	NA	NA.
Unwrought	NA	485	NA	NA.
Semimanufactures	60	57	1	France 19; Austria 6; Brazil 5.
Unspecified	645	--	--	
Uranium and/or thorium:				
Ore and concentrate value	--	$3,532	--	All to Switzerland.
Oxides and other compounds	1,974	283	--	France 147; Belgium-Luxembourg 117.
Metal including alloys, all forms, uranium and thorium kilograms	800	1,400	NA	NA.
Vanadium:				
Ash and residue containing vanadium	705	2,175	NA	Belgium-Luxembourg 1,177; Italy 949.
Metal including alloys, all forms	124	193	23	United Kingdom 85; Japan 48; France 35.
Zinc:				
Ore and concentrate	111,130	105,806	--	East Germany 44,240; Netherlands 35,672; France 9,712.
Oxides	15,767	13,550	NA	NA.
Blue powder	5,275	6,293	177	Netherlands 1,149; Romania 1,010; Hungary 820.
Matte	5,270	6,789	NA	Italy 1,612; Netherlands 1,583; Belgium-Luxembourg 1,555.
Ash and residue containing zinc	68,824	90,489	18,568	Belgium-Luxembourg 31,100; Netherlands 11,796; France 11,515.
Metal including alloys:				
Scrap	10,595	7,502	--	Netherlands 3,180; Italy 2,217; Belgium-Luxembourg 1,264.
Unwrought	112,723	126,005	36,111	Italy 20,800; Netherlands 12,423; France 11,149.
Semimanufactures	16,572	17,549	--	East Germany 1,812; unspecified 15,518.
Zirconium:				
Ore and concentrate	11,487	12,372	NA	Netherlands 2,043; Czechoslovakia 1,652; France 1,641.
Metal including alloys, all forms	50	65	NA	France 32; Sweden 13.
Other:				
Ores and concentrates	14	1	--	NA.
Oxides and hydroxides	7,349	8,206	1,276	East Germany 1,114; Italy 326; Brazil 123.
Matte, speiss, similar material	26	11	--	All to East Germany.
Ashes and residues	r59,963	64,660	131	Belgium-Luxembourg 34,768; Netherlands 23,457; Switzerland 4,797.
Pyrophoric alloys	75	55	NA	Hong Kong 13; Bulgaria 5; Nigeria 4.
Cermets	837	261	2	Italy 43; France 37; United Kingdom 36.
Base metals including alloys, all forms	r177	170	--	All to East Germany.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	491,496	310,457	12	United Kingdom 294,430; Belgium-Luxembourg 10,069; France 5,287.
Artificial:				
Corundum	59,294	51,583	2,116	Italy 7,132; Sweden 4,236; East Germany 4,007.
Silicon carbide	26,445	27,752	NA	NA.
Dust and powder of precious and semiprecious stones including diamond kilograms	564	659	76	Brazil 214; Greece 194; Austria 98.
Grinding and polishing wheels and stones	13,202	15,366	659	France 1,806; Netherlands 1,198; Switzerland 944.
Asbestos, crude	27,334	43,033	NA	NA.
Barite and witherite	45,746	54,627	291	Netherlands 16,388; France 9,077; Sweden 4,099.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Boron materials:				
Crude natural borates	11,045	4,648	--	Sweden 2,387; Finland 770; Norway 400.
Oxides and acids	42,382	11,573	--	East Germany 10,927; Czechoslovakia 168.
Cement thousand tons	2,216	2,627	(1)	Netherlands 1,483; Nigeria 291; Venezuela 207.
Chalk	27,734	36,549	33	Denmark 11,315; Finland 7,932; Sweden 7,449.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	9,490	13,573	NA	Italy 6,265; United Kingdom 2,695; Austria 966.
Bentonite	29,755	23,956	NA	France 12,181; Netherlands 3,030; Belgium-Luxembourg 2,961.
Ceramic clay	843,902	846,033	NA	Italy 343,850; Netherlands 218,656; France 135,992.
Chamotte earth	54,202	47,913	NA	Netherlands 20,922; Italy 8,649; France 6,015.
Dinas earth	65,110	55,771	NA	France 23,795; Switzerland 8,208; Italy 7,177.
Fire clay	302,716	336,259	NA	Italy 133,098; Belgium-Luxembourg 63,456; Netherlands 55,575.
Fuller's earth	5,220	4,485	NA	Netherlands 2,384; France 1,172; East Germany 264.
Kaolin	102,004	92,602	NA	Italy 26,611; Austria 13,835; Belgium-Luxembourg 12,871.
Unspecified	389,858	614,774	200	Netherlands 547,782; Italy 22,799; Austria 19,402.
Products:				
Nonrefractory	829,754	843,179	11,488	France 241,491; Belgium-Luxembourg 122,655; Switzerland 109,017.
Refractory including nonclay brick	669,801	655,251	14,559	Belgium-Luxembourg 89,133; France 88,980; Italy 38,899.
Cryolite and chiolite	38	41	--	Italy 22; Japan 9; Mexico 4.
Diamond:				
Gem, not set or strung carats	r118,523	124,313	12,768	Belgium-Luxembourg 31,533; United Kingdom 22,410; Switzerland 17,445.
Industrial do	r222,053	286,641	2,700	Ireland 91,009; Belgium-Luxembourg 61,824; Netherlands 33,620.
Diatomite and other infusorial earth	3,210	3,542	8	East Germany 1,038; Netherlands 704; United Kingdom 621.
Feldspar, fluorspar, related materials:				
Feldspar	18,124	15,308	NA	France 6,537; Austria 1,749; Netherlands 1,445.
Fluorspar	14,098	16,210	NA	Austria 4,904; Netherlands 4,296; Hungary 3,180.
Unspecified	799	777	15	Belgium-Luxembourg 623.
Fertilizer materials:				
Crude, n.e.s	62,705	59,310	--	Netherlands 50,553; Switzerland 2,292; Belgium-Luxembourg 2,139.
Manufactured:				
Ammonia thousand tons	r238	249	(1)	Denmark 182; France 40; United Kingdom 11.
Nitrogenous do	1,344	1,248	5	Belgium-Luxembourg 443; France 139; India 111.
Phosphatic do	58	40	--	Belgium-Luxembourg 18; Denmark 8; Hungary 5.
Potassic do	2,554	2,348	26	Belgium-Luxembourg 579; India 247; Ireland 183.
Unspecified and mixed do	756	718	(1)	France 155; Belgium-Luxembourg 103; Denmark 79.
Graphite, natural	8,099	8,577	763	Italy 1,748; East Germany 1,360; Iran 556.
Gypsum and plaster	390,963	374,720	136	Netherlands 223,681; Belgium-Luxembourg 46,685; Switzerland 44,001.
Halogens:				
Bromine	11	10	--	NA.
Chlorine	102,688	101,641	--	Netherlands 61,472; France 24,129; Belgium-Luxembourg 6,695.
Iodine	76	73	--	France 31; United Kingdom 10; Belgium-Luxembourg 8.
Unspecified	(1)	1	--	NA.
Lime	473,949	398,157	--	Netherlands 293,333; France 59,917; Switzerland 22,531.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Magnesium compounds:				
Magnesite	7,251	12,050	NA	France 7,172; Canada 2,687; Belgium-Luxembourg 888.
Oxides and hydroxides	7,139	6,781	NA	Italy 1,303; Austria 852; U.S.S.R. 800.
Other	4,157	4,095	31	France 1,002; Denmark 768; United Kingdom 529.
Mica:				
Crude including splittings and waste	661	1,091	67	Yugoslavia 277; Netherlands 242; Switzerland 110.
Worked including agglomerated splittings	254	268	--	United Kingdom 43; Italy 31; France 26.
Nitrates, crude	--	2,200	--	All to East Germany.
Phosphates, crude	1,555	49,027	--	East Germany 47,068; Switzerland 1,585.
Pigments, mineral:				
Natural, crude	r1,276	1,424	893	Switzerland 174; United Kingdom 66.
Iron oxides and hydroxides, processed	157,656	150,878	14,896	France 21,389; United Kingdom 12,572; Italy 11,567.
Potassium salts, crude	38,585	39,881	--	Belgium-Luxembourg 21,768; United Kingdom 15,536; Netherlands 1,350.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material kilograms	258,444	181,706	13,170	Italy 23,190; China 22,517; Hong Kong 17,361.
Quartz crystal, piezoelectric	655	78	NA	NA.
Synthetic kilograms	21,995	28,384	1,472	Japan 20,060; Italy 1,934; Yugoslavia 556.
Pyrite, unroasted	968	2,089	NA	NA.
Salt and brine thousand tons	1,841	2,048	(1)	Belgium-Luxembourg 1,288; Sweden 282; Denmark 106.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	15,000	17,175	NA	NA.
Sodium carbonate, natural and manufactured	215,524	165,273	8	Saudi Arabia 24,021; Belgium-Luxembourg 19,051; Brazil 14,975.
Sodium hydroxide thousand tons	826	1,522	102	Netherlands 408; Australia 208; Belgium-Luxembourg 142.
Sodium sulfate, natural and manufactured	81,138	95,038	NA	Belgium-Luxembourg 15,998; Italy 15,464; Switzerland 8,342.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	874	1,569	(1)	Netherlands 1,466; Switzerland 76; Austria 8.
Worked	36,775	38,717	97	Belgium-Luxembourg 7,729; Austria 6,279; Netherlands 5,081.
Dolomite, chiefly refractory-grade	302,654	296,214	185	Netherlands 141,610; France 119,542; Belgium-Luxembourg 28,890.
Gravel and crushed rock thousand tons	8,923	11,057	(1)	Netherlands 8,921; Switzerland 1,165; Belgium-Luxembourg 628.
Limestone other than dimension	72,917	33,269	--	Netherlands 16,095; Belgium-Luxembourg 13,594; Switzerland 935.
Quartz and quartzite	122,878	150,372	330	Belgium-Luxembourg 75,299; Netherlands 15,902; Austria 12,831.
Sand other than metal-bearing thousand tons	7,744	6,717	(1)	Netherlands 5,270; Belgium-Luxembourg 777; Switzerland 273.
Sulfur:				
Elemental:				
Crude including native and by-product	394,400	448,040	170	Netherlands 147,224; Denmark 76,212; Belgium-Luxembourg 31,861.
Colloidal, precipitated, sublimed	952	454	78	Italy 163; France 61; Netherlands 32.
Dioxide	35,567	14,446	NA	Netherlands 5,506; Belgium-Luxembourg 4,350; Austria 2,136.
Sulfuric acid	624,343	854,928	--	Netherlands 227,365; Belgium-Luxembourg 183,708; France 111,247.
Talc, steatite, soapstone, pyrophyllite	6,137	3,757	--	Yugoslavia 747; Netherlands 460; Belgium-Luxembourg 237.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Vermiculite, perlite, chlorite	5,183	6,156	NA	Belgium-Luxembourg 3,701; Netherlands 1,287; Austria 734.
Other:				
Crude thousand tons	1,669	1,859	31	Netherlands 1,128; Belgium-Luxembourg 158; Austria 22.
Slag and dross, not metal-bearing do	3,348	2,973	1	Netherlands 2,428; France 361; Belgium-Luxembourg 111.
Oxides and hydroxides of barium, magnesium, strontium	3,387	4,915	2,182	France 653; Belgium-Luxembourg 303; Netherlands 258.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	168,505	145,201	4,944	Netherlands 44,550; France 23,179; Switzerland 18,001.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,104	829	--	Austria 226; Netherlands 145; Sweden 101.
Carbon: Carbon black	138,360	135,106	797	France 21,867; East Germany 17,601; Austria 15,214.
Coal:				
Anthracite and bituminous thousand tons	12,369	11,996	--	France 4,452; Italy 2,591; Belgium-Luxembourg 2,226.
Briquets of anthracite and bituminous coal	357,099	365,241	--	United Kingdom 120,401; France 99,389; Belgium-Luxembourg 79,960.
Lignite including briquets	877,460	848,201	--	Belgium-Luxembourg 199,154; Austria 173,113; France 160,748.
Coke and semicoke thousand tons	8,163	6,515	--	Belgium-Luxembourg 2,468; France 1,771; Netherlands 730.
Gas, natural million cubic feet	345,325	422,643	NA	NA.
Gas, manufactured do	32	59	--	All to Switzerland.
Hydrogen, helium, rare gases do	557	552	(1)	Italy 272; Austria 85; France 63.
Peat including briquets and litter	507,005	510,951	169	Netherlands 336,005; Switzerland 49,440; France 48,800.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	9,080	7,820	(1)	East Germany 7,819.
Refinery products:				
Liquefied petroleum gas do	4,988	6,278	--	Netherlands 2,410; Italy 1,175; Belgium-Luxembourg 725.
Gasoline:				
Aviation do	80	17	--	Austria 5.
Motor do	r13,349	12,232	43	France 3,272; Netherlands 2,164; Austria 1,801.
Mineral jelly and wax do	r1,271	1,309	60	Netherlands 138; Republic of South Africa 106; Belgium-Luxembourg 74.
Kerosine and jet fuel do	r11,405	10,879	(1)	Switzerland 749; Norway 645; bunkers 8,080.
Distillate fuel oil do	r11,276	8,691	364	Netherlands 1,796; Switzerland 1,621; France 1,075.
Lubricants do	r2,654	3,075	9	Belgium-Luxembourg 502; United Kingdom 364; Netherlands 274.
Nonlubricating oils do	r100	100	NA	Switzerland 16; Republic of South Africa 10; Austria 8.
Residual fuel oil do	20,803	22,392	(1)	Netherlands 4,651; United Kingdom 2,755; Austria 2,249.
Bitumen and other residues do	2,063	2,284	(1)	Austria 851; Switzerland 398; Denmark 383.
Bituminous mixtures do	268	224	(1)	Netherlands 110; Austria 29; Switzerland 22.
Petroleum coke do	1,994	1,654	--	Netherlands 615; France 258; Switzerland 198.
Tars and other crude chemicals derived from coal, gas, and petroleum	r721,392	714,534	12,193	Netherlands 291,597; Belgium-Luxembourg 25,009; unspecified 297,895.

rRevised. NA Not available.
1Less than 1/2 unit.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Cesium and rubidium value	$21,456	$13,245	NA	NA.
Lithium:				
Oxides and hydroxides	568	1,205	319	U.S.S.R. 37; Netherlands 35.
Metal including alloys, all forms	8	7	7	
Rare-earth metals	60	76	NA	NA.
Unspecified	246	356	9	France 173; U.S.S.R. 133; Italy 21.
Aluminum:				
Ore and concentrate thousand tons	4,177	3,911	(1)	Australia 1,531; Guinea 1,379; Sierra Leone 599.
Oxides and hydroxides	440,704	470,529	2,596	Australia 271,700; Italy 143,988; Guinea 48,236.
Ash and residue containing aluminum	43,582	51,037	NA	Austria 17,143; Netherlands 6,892; Norway 6,301.
Metal including alloys:				
Scrap	174,772	160,984	8,034	Netherlands 40,430; Austria 24,239; United Kingdom 22,608.
Unwrought	608,752	478,446	6,414	Norway 205,459; United Kingdom 57,349; Netherlands 51,556.
Semimanufactures	288,045	245,586	3,488	France 71,432; Netherlands 40,478; Belgium-Luxembourg 34,923.
Antimony:				
Ore and concentrate	3,002	1,954	NA	Bolivia 615; Republic of South Africa 525; Peru 161.
Oxides	3,351	3,567	83	Belgium-Luxembourg 1,087; France 1,060; United Kingdom 807.
Metal including alloys, all forms	538	595	NA	Belgium-Luxembourg 298; China 97; Spain 72.
Beryllium: Metal including alloys, all forms kilograms	1,460	578	296	NA.
Bismuth: Metal including alloys, all forms	268	185	NA	United Kingdom 58; Japan 33; Republic of Korea 20.
Cadmium:				
Oxides and hydroxides	550	417	NA	Belgium-Luxembourg 346; United Kingdom 60.
Metal including alloys, all forms	1,198	673	NA	China 211; Belgium-Luxembourg 164; Netherlands 64.
Chromium:				
Ore and concentrate	328,847	268,237	--	Republic of South Africa 186,996; Albania 36,112; Turkey 27,691.
Oxides and hydroxides	969	1,192	108	U.S.S.R. 907; Italy 96; Spain 35.
Metal including alloys, all forms	862	569	25	France 144; United Kingdom 115; Belgium-Luxembourg 109.
Cobalt:				
Oxides and hydroxides	319	239	1	Belgium-Luxembourg 83; France 63; Netherlands 18.
Metal including alloys, all forms	1,703	1,212	39	Finland 214; Zaire 172; Belgium-Luxembourg 122.
Columbium and tantalum:				
Ore and concentrate	NA	553	NA	Malaysia 323; Brazil 116; Australia 31.
Ash and residue containing columbium and/or tantalum	NA	9,214	182	Belgium-Luxembourg 3,292; Singapore 1,667; China 478.
Metal including alloys, all forms:				
Columbium (niobium)	23	32	31	NA.
Tantalum	255	114	79	Belgium-Luxembourg 11; Japan 9; France 6.
Copper:				
Ore and concentrate	537,883	481,142	447	Papua New Guinea 212,722; Mexico 135,672; Republic of South Africa 60,903.
Matte and speiss including cement copper	11,026	4,675	10	Canada 1,978; Morocco 752; Argentina 627.
Oxides and hydroxides	263	668	NA	Belgium-Luxembourg 330; Italy 188; Netherlands 52.
Sulfate	10,759	9,356	NA	France 2,421; Belgium-Luxembourg 2,256; U.S.S.R. 1,909.
Ash and residue containing copper	38,900	34,586	199	Italy 12,460; Switzerland 3,534; France 2,642.
Metal including alloys:				
Scrap	180,971	151,352	3,490	France 38,844; United Kingdom 26,773; Netherlands 23,604.
Unwrought	554,378	492,588	3,032	Chile 125,321; Belgium-Luxembourg 76,532; Poland 75,401.
Semimanufactures	244,465	214,262	2,451	Belgium-Luxembourg 75,348; France 51,258; East Germany 22,128.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Gallium: Metal including alloys, all forms ____ kilograms__	5,800	5,600	1,400	France 1,200; Netherlands 500; Hungary 400.
Germanium: Metal including alloys, all forms ____ do____	1,800	1,900	NA	Belgium-Luxembourg 1,400; China 400.
Gold:				
Ash and residue containing gold value, thousands__	$10,566	$14,031	$8,019	Switzerland $2,199; Denmark $909; Canada $511.
Waste and sweepings ____ do____	$97,881	$53,149	$13,787	Sweden $9,139; Peru $8,533; Denmark $6,505.
Metal including alloys, unwrought and partly wrought thousand troy ounces__	4,070	2,945	45	Switzerland 1,066; Spain 516; U.S.S.R. 324.
Hafnium: Metal including alloys, all forms ____ kilograms__	300	600	500	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons__	47,917	44,288	(1)	Brazil 14,543; Liberia 7,414; Canada 5,952.
Pyrite, roasted ____	561,190	540,462	--	Spain 341,261; Belgium-Luxembourg 146,646; Portugal 22,542.
Metal:				
Scrap ____ thousand tons__	1,535	1,359	12	Netherlands 404; Belgium-Luxembourg 195; United Kingdom 175.
Pig iron, cast iron, related materials ____	324,452	264,285	67	Canada 68,131; Brazil 61,937; France 29,350.
Ferroalloys:				
Ferrochromium ____	301,021	148,161	2,015	Republic of South Africa 35,131; Zimbabwe 31,782; Sweden 23,666.
Ferromanganese ____	136,652	103,111	430	Norway 48,052; France 31,077; United Kingdom 5,137.
Ferromolybdenum ____	4,863	5,111	313	Belgium-Luxembourg 2,853; United Kingdom 692; France 342.
Ferronickel ____	71,714	64,805	NA	Greece 35,714; New Caledonia 16,506; Japan 8,307.
Ferrosilicochromium____	12,844	12,870	NA	Zimbabwe 12,005.
Ferrosilicomanganese ____	129,929	121,177	NA	Norway 78,702; Czechoslovakia 12,840; Republic of South Africa 10,714.
Ferrosilicon ____	221,565	196,904	282	Norway 89,581; France 27,286; Spain 21,171.
Unspecified ____	11,370	9,535	418	France 4,214; Brazil 2,639; United Kingdom 1,821.
Steel, primary forms thousand tons__	r1,943	2,139	(1)	Netherlands 636; East Germany 234; Austria 229.
Semimanufactures:				
Bars, rods, angles, shapes, sections____ do____	r4,102	4,120	1	Belgium-Luxembourg 983; Italy 796; France 594.
Universals, plates, sheets do____	r3,717	3,836	3	Belgium-Luxembourg 1,149; France 713; Netherlands 263.
Hoop and strip____	668,722	600,554	934	Belgium-Luxembourg 235,762; France 159,847; Netherlands 66,928.
Rails and accessories ____	26,859	28,048	7	Netherlands 9,074; East Germany 7,312; Sweden 2,198.
Wire____	250,477	270,507	419	Belgium-Luxembourg 92,740; France 37,297; East Germany 35,864.
Tubes, pipes, fittings ____	782,472	829,066	1,923	Italy 152,297; France 132,792; Netherlands 123,696.
Castings and forgings, rough __	50,379	79,562	61	East Germany 34,807; France 7,849; Netherlands 4,543.
Lead:				
Ore and concentrate____	181,679	214,800	3,129	Sweden 64,427; Canada 35,052; Ireland 20,018.
Oxides ____	7,186	5,609	56	Belgium-Luxembourg 1,279; France 1,084; East Germany 560.
Ash and residue containing lead ____	13,690	14,676	1,409	France 4,855; United Kingdom 2,782; Netherlands 1,342.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys:				
Scrap	44,308	34,594	1,799	Netherlands 12,847; United Kingdom 6,845; France 3,972.
Unwrought	160,650	115,786	11,521	United Kingdom 32,547; Belgium-Luxembourg 19,970; France 12,080.
Semimanufactures	4,367	3,279	19	Belgium-Luxembourg 2,168; France 697; Yugoslavia 147.
Magnesium:				
Metal including alloys:				
Scrap	1,250	1,123	3	Sweden 304; France 193; Denmark 174.
Unwrought	31,131	26,639	4,652	Norway 10,950; Italy 5,308; Yugoslavia 1,903.
Semimanufactures	347	682	9	Austria 218; Norway 128; France 109.
Manganese:				
Ore and concentrate, metallurgical-grade	489,548	606,851	--	Republic of South Africa 360,482; Australia 114,424; Congo 51,850.
Oxides	5,059	2,794	46	Belgium-Luxembourg 1,879; Greece 291; Ireland 163.
Metal including alloys, all forms	5,731	5,147	830	Republic of South Africa 2,393; Netherlands 1,044; France 336.
Mercury 76-pound flasks	12,659	6,154	203	China 3,596; Turkey 812; Netherlands 435.
Metalloids:				
Arsenic, oxides and acids	638	781	NA	Belgium-Luxembourg 431; France 171; Sweden 80.
Selenium and phosphorus	32,432	30,014	NA	NA.
Silicon	55,132	52,804	(1)	France 15,867; Norway 12,830; Switzerland 5,312.
Tellurium and arsenic	49	75	7	Sweden 31; U.S.S.R. 20; United Kingdom 10.
Molybdenum:				
Ore and concentrate	18,087	18,139	6,215	Canada 3,279; Belgium-Luxembourg 1,764; Chile 1,614.
Oxides and hydroxides	453	502	69	Netherlands 219; China 100; Belgium-Luxembourg 61.
Metal including alloys:				
Scrap	NA	521	13	Austria 372; Sweden 73; France 35.
Unwrought	NA	131	43	Sweden 58; France 9; Austria 8.
Semimanufactures	354	332	68	Austria 229; France 12; Netherlands 9.
Unspecified	747	--		
Nickel:				
Ore and concentrate	39	70	--	Australia 25; United Kingdom 25.
Matte and speiss	14,116	12,361	--	Australia 7,739; Canada 2,016; Cuba 1,543.
Oxides and hydroxides	391	315	NA	Canada 151; Netherlands 98; France 23.
Ash and residue containing nickel	1,692	2,113	NA	France 406; Netherlands 328; United Kingdom 235.
Metal including alloys:				
Scrap	7,551	5,469	703	France 1,325; United Kingdom 881; Netherlands 620.
Unwrought	39,329	39,928	6,350	U.S.S.R. 6,624; Canada 6,306; Australia 5,547.
Semimanufactures	6,723	5,833	638	France 2,080; Philippines 1,130; United Kingdom 1,103.
Platinum-group metals:				
Ash and residue containing platinum value, thousands	$2,482	$2,093	$536	Switzerland $443; France $391; Israel $233.
Waste and sweepings, platinum do	$71,058	$42,277	$1,548	Netherlands $7,039; Hungary $5,729; Belgium-Luxembourg $5,381.
Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	367,909	317,128	22,836	U.S.S.R. 178,813; United Kingdom 66,136; Switzerland 21,505.
Platinum do	416,969	473,210	80,471	United Kingdom 122,779; Switzerland 78,380; Republic of South Africa 59,091.
Unspecified do	120,025	106,409	51,227	Switzerland 16,043; United Kingdom 14,523; Republic of South Africa 12,700.
Rhenium: Metal including alloys, all forms value, thousands	$1,005	$267	NA	NA.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Silver:				
Ash and residue containing silver value, thousands	$41,125	$19,454	$10,007	Netherlands $2,956; Sweden $2,148; Austria $1,170.
Waste and sweepings do	$78,265	$16,987	$3,959	Sweden $3,560; Yugoslavia $1,734; Denmark $1,284.
Metal including alloys, unwrought and partly wrought thousand troy ounces	35,661	25,957	1,800	Sweden 5,592; Switzerland 5,046; Poland 2,268.
Tin:				
Ore and concentrate	3,343	3,229	18	United Kingdom 2,203; Bolivia 834; Chile 124.
Oxides	36	35	NA	France 14; Italy 11; United Kingdom 5.
Ash and residue containing tin	20,428	4,253	949	Malaysia 1,394; Netherlands 593; United Kingdom 451.
Metal including alloys:				
Scrap	324	344	(1)	Netherlands 96; Belgium-Luxembourg 58; Switzerland 54.
Unwrought	18,304	17,052	45	Thailand 6,230; Indonesia 4,579; Malaysia 1,890.
Semimanufactures	1,541	989	1	Netherlands 886; United Kingdom 55; Belgium-Luxembourg 27.
Titanium:				
Ore and concentrate	484,902	538,968	NA	Norway 340,530; Canada 143,598; India 30,864.
Oxides	18,329	20,691	1,931	Belgium-Luxembourg 11,379; France 2,637; Spain 1,376.
Metal including alloys, all forms	4,878	4,844	306	Japan 2,962; U.S.S.R. 727; United Kingdom 391.
Tungsten:				
Ore and concentrate	2,931	2,698	--	China 894; Australia 588; France 305.
Oxides and hydroxides	127	33	NA	Sweden 22; France 6; China 5.
Ash and residue containing tungsten	324	282	86	France 127; Sweden 40.
Metal including alloys:				
Scrap	NA	781	29	United Kingdom 274; Israel 215; Austria 75.
Unwrought	NA	273	4	Austria 188; Belgium-Luxembourg 24; France 24.
Semimanufactures	109	78	26	Austria 25; Netherlands 9; France 6.
Unspecified	861	--		
Uranium and/or thorium:				
Ore and concentrate value, thousands	--	$8	--	All from Netherlands.
Oxides and other compounds	910	550	12	U.S.S.R. 508; France 2.
Metal including alloys, all forms:				
Uranium value, thousands	$113	$27	NA	NA.
Thorium do	$14	$61	$58	NA.
Vanadium:				
Oxides and hydroxides	1,382	2,224	45	China 474; Belgium-Luxembourg 100.
Ash and residue containing vanadium	44,422	36,685	NA	China 4,944; Belgium-Luxembourg 698.
Metal including alloys, all forms value, thousands	$32	$44	NA	NA.
Zinc:				
Ore and concentrate	618,984	506,148	10,576	Canada 138,406; Sweden 73,127; Republic of South Africa 40,545.
Oxides	7,089	6,377	33	France 2,198; Netherlands 1,493; Italy 937.
Blue powder	14,475	12,009	NA	Belgium-Luxembourg 8,223; Netherlands 1,247; France 1,101.
Matte	3,339	4,986	NA	Netherlands 1,169; Belgium-Luxembourg 955; Hungary 597.
Ash and residue containing zinc	71,732	125,630	11,237	Belgium-Luxembourg 22,325; Peru 17,957; United Kingdom 17,414.
Metal including alloys:				
Scrap	11,128	23,968	959	Netherlands 8,209; United Kingdom 3,763; Denmark 2,436.
Unwrought	161,781	137,964	--	Belgium-Luxembourg 56,972; Netherlands 27,022; Norway 13,669.
Semimanufactures	25,673	24,990	9	France 18,760; Netherlands 3,355; Yugoslavia 1,447.
Zirconium:				
Ore and concentrate	56,086	69,444	1,232	Australia 36,184; Republic of South Africa 24,132; Sri Lanka 3,385.
Metal including alloys, all forms	279	167	36	France 95; Sweden 26; United Kingdom 3.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Other:				
Ores and concentrates	8,642	9,852	NA	Chile 8,911; Cyprus 620; Republic of South Africa 150.
Oxides and hydroxides	487	2,447	962	France 810; United Kingdom 322; Netherlands 219.
Ashes and residues	248,407	286,215	7,991	Canada 176,372; East Germany 10,184; Belgium-Luxembourg 1,871.
Pyrophoric alloys	14	30	NA	Austria 22; Netherlands 6.
Cermets	1,011	770	175	Sweden 260; France 67; Austria 52.
Base metals including alloys, all forms	67	206	--	All from East Germany.
NONMETALS				
Abrasives, n.e.s:				
Natural: Corundum, emery, pumice, etc	249,522	133,008	855	Greece 99,986; Italy 23,802; Portugal 6,413.
Artificial:				
Corundum	41,497	41,209	1,272	Netherlands 16,125; Hungary 6,608; Austria 5,245.
Silicon carbide	72,364	67,530	1,380	Norway 12,489; Italy 2,997; U.S.S.R. 2,297.
Dust and powder of precious and semi-precious stones including diamond kilograms	397,430	200,504	68,681	Canada 130,634; Ireland 791; Romania 135.
Grinding and polishing wheels and stones	8,897	8,475	250	Italy 1,770; Austria 1,739; Spain 1,100.
Asbestos, crude	392,978	171,708	420	Canada 112,115; U.S.S.R. 22,943; Italy 20,913.
Barite and witherite	211,315	166,066	--	France 88,626; Spain 32,260; China 26,494.
Boron materials:				
Crude natural borates	124,693	124,085	96,571	Turkey 24,214; France 2,855; Netherlands 356.
Oxides and acids	87,072	17,491	31	France 8,518; Turkey 5,374; Italy 1,690.
Cement thousand tons	1,686	1,816	(1)	Belgium-Luxembourg 506; East Germany 446; France 432.
Chalk	121,736	130,773	3	France 101,227; Belgium-Luxembourg 13,249; East Germany 11,739.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	101,824	70,473	49,788	Republic of South Africa 18,630; United Kingdom 1,000; France 493.
Bentonite	78,043	77,231	39,878	Greece 25,023; Belgium-Luxembourg 3,579; Italy 2,489.
Ceramic	133,303	93,337	NA	France 28,252; Netherlands 19,859; East Germany 17,099.
Chamotte earth	79,704	77,216	419	Czechoslovakia 41,739; France 26,295; Belgium-Luxembourg 2,420.
Dinas earth	3,949	1,100	--	NA.
Fire clay	158,659	101,108	12,685	Czechoslovakia 34,524; France 32,140; United Kingdom 7,233.
Fuller's earth	5,676	5,706	3,209	Netherlands 1,136; Spain 1,027.
Kaolin	859,571	834,114	117,251	United Kingdom 426,400; Czechoslovakia 131,784; France 55,694.
Unspecified	139,188	138,098	18,060	Czechoslovakia 48,316; France 46,519; Netherlands 16,722.
Products:				
Nonrefractory thousand tons	1,871	1,697	(1)	Netherlands 578; Italy 566; France 190.
Refractory including nonclay brick	266,000	215,504	1,945	Austria 42,551; France 30,483; Czechoslovakia 20,938.
Cryolite and chiolite	2,066	2,113	--	All from Greenland.
Diamond:				
Gem, not set or strung thousand carats	561	496	8	Belgium-Luxembourg 255; Israel 64; U.S.S.R. 60.
Industrial do	1,105	962	31	Republic of South Africa 495; Belgium-Luxembourg 272; Zaire 55.
Diatomite and other infusorial earth	37,506	36,421	6,964	Denmark 20,514; France 6,500; Ireland 985.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Feldspar, fluorspar, related materials:				
Feldspar	63,213	60,031	NA	Norway 26,530; Italy 14,993; Finland 9,007.
Fluorspar	279,058	203,110	NA	China 20,719; Republic of South Africa 27,546; United Kingdom 20,719.
Unspecified	56,075	49,761	83	Norway 35,375; Netherlands 14,137.
Fertilizer materials:				
Crude, n.e.s	28,550	28,004	1,119	Netherlands 20,517; Republic of South Africa 2,703; Italy 1,770.
Manufactured:				
Ammonia	283,000	309,808	20,991	France 112,202; Netherlands 43,143; U.S.S.R. 40,436.
Nitrogenous thousand tons	1,586	2,186	57	East Germany 541; Belgium-Luxembourg 453; Netherlands 423.
Phosphatic do	1,005	916	1	Belgium-Luxembourg 748; France 92; Netherlands 23.
Potassic	94,000	88,345	--	France 85,964; Belgium-Luxembourg 2,142.
Unspecified and mixed	971,000	948,442	96,359	Austria 236,743; Netherlands 126,064; Belgium-Luxembourg 112,763.
Graphite, natural	25,123	29,762	62	China 9,588; Austria 4,608; Madagascar 2,459.
Gypsum and plaster	689,483	766,096	53	France 476,043; Austria 181,218; Belgium-Luxembourg 82,705.
Halogens:				
Bromine	2,982	2,908	--	Israel 2,243; United Kingdom 399; Netherlands 137.
Chlorine	76,636	81,504	(1)	Poland 36,041; Austria 18,374; Netherlands 11,979.
Iodine	1,140	1,290	5	Japan 794; Chile 462; France 18.
Unspecified	110	17	--	NA.
Lime	188,096	225,723	(1)	France 131,384; Denmark 36,695; East Germany 30,440.
Magnesium compounds:				
Magnesite	320,540	251,469	21,317	Greece 60,361; Czechoslovakia 35,609; China 28,121.
Oxides and hydroxides	9,496	5,014	544	France 1,720; United Kingdom 978; Norway 770.
Other	90,018	85,028	250	Greece 29,243; Austria 22,934; China 14,338.
Mica:				
Crude including splittings and waste	10,330	9,074	379	India 3,232; China 1,076; France 1,031.
Worked including agglomerated splittings	702	613	(1)	Belgium-Luxembourg 205; France 200; Spain 71.
Nitrates, crude	3,136	5,550	--	Chile 3,260; East Germany 2,215; Belgium-Luxembourg 75.
Phosphates, crude thousand tons	2,560	2,210	1,082	Morocco 464; U.S.S.R. 387; Israel 103.
Pigments, mineral:				
Natural, crude	r271	187	NA	Cyprus 104.
Iron oxides and hydroxides, processed	6,550	6,089	329	Netherlands 2,009; France 1,547; Belgium-Luxembourg 895.
Potassium salts, crude	125,000	84,733	--	All from East Germany.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material	1,723	1,340	109	Brazil 879; Zambia 26; Pakistan 25.
Quartz crystal, piezoelectric kilograms	517	190	NA	NA.
Synthetic do	21,437	43,896	23,721	Switzerland 11,888; Bulgaria 3,205; Japan 2,516.
Pyrite, unroasted	132,716	57,735	--	Norway 39,088; Yugoslavia 9,105; U.S.S.R. 8,027.
Salt and brine	628,219	701,547	29	Netherlands 469,095; France 144,390; Italy 48,215.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	4,100	1,712	1	East Germany 419; Romania 286; Netherlands 244.
Sodium carbonate, natural and manufactured	215,886	211,700	2,207	Netherlands 42,108; Poland 37,028; France 23,526.
Sodium hydroxide	120,434	131,462	(1)	Belgium-Luxembourg 54,621; Netherlands 16,616; Czechoslovakia 14,283.
Sodium sulfate, natural and manufactured	43,548	48,450	NA	United Kingdom 18,922; Austria 12,475; France 6,228.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	616,024	468,603	86	Austria 86,431; Sweden 57,539; Denmark 50,753.
Worked	832,618	709,441	5	Italy 415,390; Portugal 124,192; Spain 25,657.
Dolomite, chiefly refractory-grade	772,456	569,885	--	Belgium-Luxembourg 498,857; Norway 16,516; Spain 12,056.
Gravel and crushed rock thousand tons	12,968	14,466	(1)	France 6,937; East Germany 3,096; Denmark 1,784.
Limestone other than dimension do	1,272	1,038	--	Austria 510; Belgium-Luxembourg 208; France 184.
Quartz and quartzite	110,934	99,616	559	Belgium-Luxembourg 43,577; Netherlands 27,652; Yugoslavia 9,980.
Sand other than metal-bearing thousand tons	6,223	4,051	2	France 2,414; Netherlands 961; Denmark 289.
Sulfur:				
Elemental:				
Crude including native and by-product	360,317	277,808	82,446	Poland 108,453; Canada 78,980; France 4,431.
Colloidal, precipitated, sublimed	661	507	1	France 441; Netherlands 65.
Dioxide	5,731	7,153	NA	Sweden 5,543; Switzerland 1,584.
Sulfuric acid	33,774	45,704	(1)	Switzerland 16,230; France 14,345; Belgium-Luxembourg 10,395.
Talc, steatite, soapstone, pyrophyllite	130,765	122,477	375	Austria 52,139; France 25,428; Italy 10,666.
Vermiculite, perlite, chlorite	140,720	106,557	1,129	Greece 72,476; Mozambique 14,521; Hungary 13,384.
Other:				
Crude thousand tons	1,096	1,142	7	Norway 426; Austria 189; France 173.
Slag and dross, not metal-bearing do	2,024	1,820	2	France 938; Belgium-Luxembourg 536; Austria 105.
Oxides and hydroxides of barium, magnesium, strontium	921	800	266	Netherlands 142; France 101; U.S.S.R. 94.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	176,282	135,114	1,629	Belgium-Luxembourg 32,754; Czechoslovakia 26,268; France 23,745.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	18,185	15,099	6,847	Trinidad and Tobago 7,747; United Kingdom 159; Spain 52.
Carbon:				
Carbon black	3,555	3,249	14	Netherlands 2,775; France 190; United Kingdom 106.
Gas carbon	52,158	44,255	2,637	France 17,484; Netherlands 12,672; U.S.S.R. 4,604.
Coal:				
Anthracite and bituminous thousand tons	9,123	10,320	2,944	United Kingdom 1,854; Republic of South Africa 1,825; Poland 1,012.
Briquets of anthracite and bituminous coal	365	87	11	Belgium-Luxembourg 47; United Kingdom 29.
Lignite including briquets thousand tons	3,223	3,971	(1)	Czechoslovakia 2,464; East Germany 1,243; Poland 24.
Coke and semicoke do	1,225	1,111	102	France 303; United Kingdom 229; East Germany 129.
Gas, natural million cubic feet	1,765,080	2,000,966	NA	NA.
Hydrogen, helium, rare gases do	883	808	17	Netherlands 388; Belgium-Luxembourg 372; Poland 12.
Peat including briquets and litter	83,069	55,510	--	U.S.S.R. 49,560; Poland 2,405; Hungary 1,311.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	697,460	586,135	--	Saudi Arabia 186,561; United Kingdom 116,384; Libya 79,036.
Refinery products:				
Liquefied petroleum gas do	7,219	7,261	--	Netherlands 2,425; Saudi Arabia 1,705; Czechoslovakia 719.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Gasoline:				
Aviation thousand 42-gallon barrels	289	1,474	--	Netherlands 910; France 264; Belgium-Luxembourg 251.
Motor do	r78,554	74,257	187	Netherlands 28,876; U.S.S.R. 11,544; Belgium-Luxembourg 9,276.
Mineral jelly and wax do	r1,528	1,605	4	Netherlands 237; France 114; unspecified 970.
Kerosine and jet fuel do	r17,761	17,366	74	Netherlands 9,093; Belgium-Luxembourg 3,531; Libya 2,422.
Distillate fuel oil do	r124,966	105,126	113	Netherlands 43,119; Belgium-Luxembourg 12,182; U.S.S.R. 11,787.
Lubricants do	r2,402	1,708	224	France 437; United Kingdom 310; Netherlands 210.
Nonlubricating oils do	r71	73	2	France 26; Netherlands 21; Belgium-Luxembourg 9.
Residual fuel oil do	r53,823	43,521	67	Netherlands 13,265; France 4,488; East Germany 4,008.
Bitumen and other residues do	2,515	1,872	(1)	France 645; Netherlands 563; Hungary 37.
Bituminous mixtures do	130	146	4	Netherlands 97; France 20; Belgium-Luxembourg 7.
Petroleum coke do	6,213	5,701	5,079	United Kingdom 263; Netherlands 201.
Tars and other crude chemicals derived from coal, gas, and petroleum thousand tons	2,130	1,965	40	Netherlands 866; France 145; Belgium-Luxembourg 77.

rRevised. NA Not available.
[1]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Iron, lead, and zinc were the only major metallic ores mined, employing 1,825 workers. Productivity in lead-zinc production reportedly fell per worker per shift, with the average metal content per ton of crude ore also declining.

Preussag AG, traditionally a producer of lead and zinc, continued to move into other nonferrous metals. Rationalization of production at its plants in the Harz Mountains and emphasis on secondary lead and zinc smelting were part of this diversification. The metals division of Preussag, Preussag Metall AG, was based in Goslar and managed the Rammelsberg and Grund Mines in the Harz region, the Oker smelter just outside Goslar, and two smelters at Nordenham. The metals division also operated the minor metals plant at Langelsheim, five galvanizing plants, two diecasters, and several other plants in Western Europe and elsewhere. Production at Langelsheim included germanium, gallium, arsenic, selenium, indium, mercury, tellurium, antimony, thallium, and several other metals used in the chemical, electronic, and telecommunications industries, chiefly byproducts from bauxite and zinc, lead, and copper concentrates. The Langelsheim plant also processed residues from the plants at Oker, Nordenham, and elsewhere.

Aluminum.—Total primary aluminum capacity was more than 731,000 tons in 1982, produced by six companies at nine plants. The largest producer, with 45% of total domestic capacity, was Vereinigte Aluminum Werke AG. The company lost over $39 million, but was reported to have initiated a recovery plan for 1983.

Alcan Aluminium Werke GmbH (AAW), the smallest aluminum producer in the FRG, with a capacity of 46,000 tons per year, and a wholly owned subsidiary of Aluminum Co. of Canada Ltd. (Alcan), acquired 95% of Ohler Eisenwerk Theab Pfeiffer AG at Plettenberg-Ohle. The new managing company was to be called Alcan Ohler GmbH and was the largest rigid foil container manufacturer in the FRG with 60% of the country's market. The company produced about 8,000 tons of foil and had more than 600 employees. AAW reportedly

shut down its only aluminum smelter at Ludwigshafen at the end of the year because of the high cost of energy. AAW's decision apparently affected plans for the construction of a 1,300-megawatt atomic reactor at Neupotz.

Giulini Chemie GmbH, the smallest alumina producer, with under 8% of domestic capacity, and a subsidiary of Israel Chemicals Ltd., was reportedly purchased by the Aluminum Co. of America. The purchase included the 140,000-ton-per-year alumina refinery at Ludwigshafen and all stocks and raw materials.

Cobalt.—Herman C. Stark was virtually the only producer of cobalt. The company also produced a wide range of specialty metals and chemical salts at its plants in Goslar and Laufenburg. Production of cobalt metal and salts was running near capacity, in spite of the recession and the generally poor market for refined cobalt. The company specialized in the production of cobalt metal powders, salts, carbonates, hydroxides, and driers. In 1982, it was one of the world's largest producers of cobalt metal powder, with sales throughout the world. Two types of powder were produced, an extra-fine powder with particle size between 1 and 1.5 micrometers and a fine powder in the range of 2 to 4 micrometers.[3]

Copper.—Copper production has been stable for several years. Nevertheless, the smaller of the two major copper producers, Hüttenwerke Kayser AG, had expanded its tankhouse capacity at Lunen from 85,000 tons per year of electrolytic copper in 1981 to more than 105,000 tons in 1982. Almost all production was to be in cathodes, although limited production of wirebar was to continue for awhile until it is phased out. Much of the company's output was sold under long-term contracts that offered some security during the recession, and the rest was sold on the spot market.

The largest copper producer, Norddeutsche Affinerie AG, in Hamburg, with an estimated capacity of 245,000 tons per year, did not do as well in 1982. The company also operated a 180,000-ton-per-year continuously cast rod plant in Hamburg.

The copper industry depended largely on scrap supplies for its feed; only 10% to 30% of its output came from primary domestic production. Copper scrap came from France, the Netherlands, the United States, and increasingly from Great Britain. Mostly because of low prices, U.S. export of scrap to the FRG fell to 26,757 tons in 1980 and to 12,000 tons in 1981.

Because of stringent pollution controls, there was a drastic drop in scrap burning, but a corresponding increase in the number of shredders, which have tripled over the last 10 years to about 15. It was estimated that about 50% of shredded copper consisted of No. 2 granules, which were 98.5% copper.

Iron and Steel.—The steel crisis continued during 1982, owing to worldwide economic recession and competition from developing countries. Steel output fell to the lowest level in 16 years, and low prices depressed company profits. Of the 18 producing companies, Thyssen AG was the largest, with almost 30% of domestic production capacity. The year was marked by restructuring plans for the top producers to consolidate into two steel giants, Thyssen joining Friedrich Krupp Hüttenwerke AG, and Klöckner Werke AG with Stahlwerke Peine-Salzgitter AG and Hoesch Werke AG.

There were five operating iron mines in the country, with a total production of crude ore of 1.3 million tons. In descending order of production, they were Leonie, 581,000 tons; Wohlverwahrt-Nammen, 437,000 tons; Haverlahwiese-Konrad, 238,800 tons; Fortuna, 57,000 tons; and Schottenbach, 5,000 tons. The mines produced 16% less ore than during previous years, and the Haverlahwiese Mine was shut down because of depletion. Employment fell to 675 miners from 807 in 1981, even though productivity rose to an average of 43.2 tons of crude ore per worker per shift with the highest productivity of 72.7 tons per worker at Wohlverwahrt-Nammen.

In 1982, there were 180,000 workers employed by the steel industry. Short-time working hours affected 33,500 steelworkers, or 18.6% of the total, compared with only 7.7% in 1981.

Lead and Zinc.—Two companies operated four lead-zinc mines at about the same output of crude ore as in 1981. Stagnant lead metal production was attributed to insufficient supply of secondary materials at reasonable prices. Stricter environmental regulations impacted detrimentally on the lead and zinc industry by delaying start of new plants.

One-third of smelting was based on domestic and imported concentrates, and the remainder came from recycled materials. Three-quarters of smelted zinc came from domestic and imported concentrates, and the remainder was from scrap, ash, and

slag. Neither lead nor zinc production had kept abreast of the rise of GNP in real terms, and the relative importance of both metals in the total industry of the FRG was diminishing.

One of the oldest mines in Europe was the Rammelsberg lead and zinc mine at Goslar, which in 1982 produced about 30% of the country's domestic lead-zinc requirements. The ore, however, was being depleted rapidly, and Preussag had plans to close the mine in 1988. The company was exploring for new deposits nearby and looking for ways to keep the miners employed after the mine closes. One approach that was considered was to turn the mine into a museum, and another was the reworking of the old dump. The mine produced about 115,000 tons of concentrate containing 28% zinc. It was also virtually the only mine in the FRG that produced copper concentrate. The Grund Mine at Bad Grund was also a significant producer of lead and zinc; it was responsible for about 40% of the country's lead, 20% of the zinc, and 50% of the silver output. The lead and zinc smelter at Oker, just south of Goslar, until a few years ago processed most of the high-grade concentrates produced in the Harz Mines. In 1981, however, primary zinc production was stopped, and the plant in 1982 smelted only secondary lead and zinc. Most of the zinc scrap and slag was imported for the production of zinc slabs, bars, and ingots for the galvanizing industry.

NONMETALS

Bentonite.—Two companies produced bentonite, Sud Chemie AG, the largest, and Erbsloh und Co. The capacity of the latter was 100,000 tons of sodium and calcium bentonite and 150,000 tons of raw clay per year, but capacities for Sud Chemie were unavailable. Sud Chemie operated mines in Bavaria near Freising, Mainburg, and Landshut, and a processing plant at Moosburg in Bavaria. The company produced all kinds of bentonite and had subsidiaries in France, Italy, and Mexico. Erbsloh operated mines near Landshut and two plants at Landshut. All production was principally for foundry applications.

The FRG consumed from 325,000 to 345,000 tons of bentonite, which was a decline of more than 50% since 1974, when a high of 600,000 tons was reached. In 1981, about 150,000 to 160,000 tons was used for foundries, 35,000 tons for bleaching acid-activated clays, 30,000 tons for engineering, 5,000 to 10,000 tons for absorbents, 5,000 to 10,000 tons for agricultural applications, 1,000 tons for organic coated bentonites, and about 18,000 tons for other applications.

Fertilizer Materials.—The fertilizer industry had been experiencing a reduction in production and capacity for the last several years. In mid-1981, the Chemische Werke Huls AG shut down its ammonia units at Bottrop and Herne, which had a total capacity of 300,000 tons per year of nitrogen in ammonia. Complex fertilizer capacity was also cut back considerably in 1982 with the closure of the Gewerkschaft Victor Chemische Werke AG plant at Castrop Rauxel and the Ruhr-Chemie AG plant at Oberhausen Holten with capacity totaling 829,000 tons per year. In addition, other plants have been operating at reduced rates.

Fluorspar.—Three companies accounted for all of the small domestic fluorspar output. Fluss-und Schwerspatwerke Pforzheim GmbH, a subsidiary of Bayer AG of Leverkusen, operated mines at Kaersteige and Gottesehre and processed the ore at company plants at Pforzheim and St. Blasien/Bildstein. Combined acid-grade spar production capacity of the company was about 55,000 tons per year, although the output was supplemented by imported high-grade concentrates. VAW Flusspat-Chemie GmbH, a subsidiary of Vereinigte Aluminum Werke, had a 30,000-ton-per-year production capacity of acid spar at its plant at St. Stulln, from mines in Lissenthan, Stulln, and Wolsendorf. The third company, Sachtleben Bergbau GmbH, a subsidiary of Metallgesellschaft, had a 30,000-ton-per-year capacity of acid spar as a byproduct of its barite operations at Wolfach and Bad Lauterberg.

Potash and Salt.—Kali und Salz AG (K&S) operated all eight domestic potash mines, which are in the Zechstein Basin, and was the largest potash producer in Western Europe and the fourth largest in the world. The company also operated two salt mines in the Zechstein Basin, which stretches from Poland to the northeast of England. The production of potash and salt was lower because of reduced demand both domestically and abroad. More than 50% of the output was exported. K&S suffered a severe decline in profits in 1982, when net earnings fell to $6 million, the lowest since 1972. In 1980 and 1981, the company had managed to hold net profits above $20 million.

Structural geologic conditions in Lower

Saxony, in the north, differ considerably from those in Hesse, in the south. In the north the deposits are steeply folded and faulted, while in the south the beds are horizontal and less deformed. In both regions, the ore is mined by drilling and blasting, except that in the north the ore is extracted by stoping, while in the south it is extracted by the room-and-pillar method. Carnallite, sylvinite, and rock salt were the major ores mined by K&S. The ore refining processes included flotation, thermal dissolution, and electrostatic separation. Electrostatic separation was used for the production of potassium chloride, kieserite (magnesium sulfate), and rock salt from ores of different composition. About 10 million tons per year of potash was processed by electrostatic separation. The actual capacity of K&S was 2.7 million tons of K_2O equivalent, 80% of which was in the form of chlorides and the rest in sulfates. The company was the largest producer of magnesium sulfates and potassium chlorides in Europe.

About 65% of the potassium chloride was upgraded to 60% to 63% K_2O content, mainly in fine or granulated grades. The fine product was produced at mines in Salzdetfurth, Sigmundshall, and Wintershall with a total capacity of 800,000 tons per year of K_2O equivalent. Coarse and granulated chlorides were produced at Bergmannssegen-Hugo, Hattorf, and Salzdetfurth Mines, which had a total annual capacity of 400,000 tons K_2O. Potassium sulfates were produced in the Werra region and in the Hattorf (two-thirds of total) and Wintershall Mines. Total sulfate capacity surpassed 400,000 tons per year of K_2O, which represented 30% of world sulfate production capacity.[4]

The Friedrichshall potash mine, purchased by K&S from Kali Chemie AG in 1981, was joined underground in 1982 to the nearby Bergmannssegen-Hugo shaft. Surface operations of the former were discontinued, and the mine shafts were filled in. This marked the completion of the first stage of a project that will lead to the output of potash and other minerals from both Friedrichshall and Bergmannssegen-Hugo, via the latter's hoisting facilities. Mine workings in the Hugo section were 3,000 feet deep, while those at Friedrichshall were 2,300 feet deep. Two interconnecting tunnels were cleared, one at the lower and another at the higher level. The higher level was used for access by machinery and personnel, and the lower, for ore crushing and conveying.

K&S also produced about 1.1 million tons of rock salt, or 16% of domestic output. About 60% of production was for human and chemical consumption, the rest was used for road deicing.

Refractories.—Owing to changing technology in steelmaking, the production of refractories continued to decline and most likely will continue to do so for at least the next several years. Once the open hearth furnaces disappear, brick consumption may be less than 3 pounds per ton of steel. The steel industry was the main user of refractory bricks, accounting for 50% to 70% of production. The production and use of monolithics, however, continued to increase, reaching 40% of the total. Almost one-half of the monolithics was based on fire clay sand with 90% to 95% SiO_2, a low-cost material for the lining of steel ladles and cupolas.

The FRG possessed only the inexpensive raw materials necessary for the production of refractories—clay, quartzite, and dolomite. Low-flux clay, for example, was imported from England and France, as were all other high alumina and magnesia-chrome products. As previously, there were no import duties on refractory raw materials. High-value materials were imported from Belgium, China, France, South America, and other countries.[5]

MINERAL FUELS

Consumption of primary energy continued the fall that began in 1980, to about 365 million tons of coal equivalent, or 2% less than that of 1981. About 22 million tons of hard coal, approximately one-quarter of annual production, remained stockpiled even though mines in the Ruhr and the Saar produced 22% less coal than in 1970. Oil refineries also operated at barely one-half capacity, with several refineries closed down. The use of gas has continued to fall since 1980, even though consumption went up from 5.6% in 1970 to 17.5% in 1980. The high cost of energy, reduced energy consumption, and the decline of production by the energy-intensive primary industry contributed to the fall.

A new nuclear powerplant became operative, and there were then 11 operating and 4 experimental nuclear powerplants, with a total capacity of 12,000 megawatts. The combined output of the 11 coal and 1 lignite power stations was put at 7,650 megawatts. The Government spent $5.5 billion between

1956 and 1981 on nuclear energy research and development, $3 billion of which was for light-water-reactor technology, $1.4 billion for breeder reactors, and $1.1 billion for high-temperature reactors. In the middle of the year, Spain and the FRG had also agreed to build a solar thermal plant twice as powerful as the "Solar One" plant recently put into service by the Southern California Edison Co. and the Department of Energy at Barstow, Calif. The design and component testing would amount to $39.4 million, leading to the construction of a 20-megawatt plant in the Spanish province of Badajoz on the Portuguese border. Full construction was to cost $396 million, with two-thirds of the cost provided by the FRG. In general, expenditures for energy research were approved to rise to $1.3 billion in 1985 from $816 million in 1981, $490 million of which was intended for coal research, $341 million specifically for coal processing.

Coal.—Anthracite and bituminous coal were mined in four coalfields. The respective share of each coalfield in the total output of 89 million tons was as follows: Ruhr, 79.6%; Saar, 12.3%; Aachen, 5.6%; and Ibbenburen, 2.5%. Longwall mining was almost the only method of mining employed in all the coalfields. The mining techniques and equipment used in each coalfield were virtually identical. The mines in the FRG were the most highly mechanized in the world. Average daily output per colliery working day rose again in 1982, but only in the Ruhr, by about 10%, to an average output of 9,557 tons per day. Collieries in the Aachen Coalfield had the lowest productivity, where the output was 30% below the national average. The average face length was 693 feet, significantly below the national average, and the average working thickness was 30% below the average. The daily advance of faces in Aachen was 10% greater than average, but the average face output was almost 50% lower. In the Ibbenburen Coalfield, both the working thickness and the average face output were also below the national average, by about 20%. Only in the Saar Coalfield were both the working thickness of seams and the average face output well above the national average, by 40% and 20%, respectively.

Power-generating stations were the only ones that used more coal, substituting it for oil and gas. The electric power industry used about 37 million tons of coal and thus surpassed the steel industry's consumption for the first time. In 1982, 15 coal-fired generating plants were under construction, 6 of them in the 350- to 750-megawatt class, with a total capacity of 8,200 megawatts and costing approximately $47 billion. They were scheduled to start operation between 1983 and 1986 and, when completed, will consume about 10 million tons of coal per year.

Ruhrkohle AG completed a 20-foot diameter, 2,000-foot-deep shaft at Voerde in the Lower Rhine. When completed, the shaft is to be almost 3,500 feet deep. The weak beds were reinforced by a refrigeration system freezing the ground for stability. For this purpose, a freezing plant was built on the surface with a total output of 3.5 megawatts.

Over 90% of lignite production came from the Ruhr Basin. Production and employment declined in 1982, mostly owing to mine closures and poor sales. By yearend, about 21,000 workers were employed by the lignite industry, 500 fewer than in 1981.

Petroleum and Natural Gas.—Production of petroleum continued its decline since 1970, owing to depletion of old oilfields. It was anticipated that the trend will be reversed when the first offshore field, Schwedeneck in the Baltic Sea, becomes operational. The fixed offshore drilling platforms were to be completed in 1983 and become the first West German offshore oil producers. The area west of Ems River produced over 34% of the crude, in eight oilfields.

Because of reduced demand, the production of natural gas fell, mostly from the area between the Weser and Ems Rivers, by 13.7% and around Hannover by 4%. The Weser-Ems area produced nearly 400 billion cubic feet of gas, accounting for 60% of total output.

Even though oil and gas drilling increased by 27.3%, there were no significant discoveries. During the year, a total of 144 sites were drilled, of which 72 struck some oil and gas. Production came from 83 small gasfields, making up about 16% of total energy requirements. Natural gas reserves were as follows, in billion cubic feet: proven, 10,500, and recoverable, 6,100.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted to U.S. dollars from Deutsche marks (DM) at the rate of DM2.45=US$1.00 for 1982.

[3]Mauser, R. West German Metals—Confident Industry Survives Recession. Met. Bull. Mon., June 1982, pp. 35-52.

[4]Ruping, G. et al. The Potash Industry of the Federal Republic of Germany. Phosphorus and Potassium, No. 124, 1983, pp. 22-27.

[5]Jeschke, P., M. Oberach, and M. Koltermann. Recent Tendency of Refractories for the Steel Industry in West Germany. "IM" Refractories Supplement, 1983, pp. 31-37.

The Mineral Industry of Ghana

By Ben A. Kornhauser[1]

In 1982, the mineral industry of Ghana continued to deteriorate, albeit more slowly, with no stimulus from a depressed world economy. Imported oil consumed about 40% of Ghana's export earnings. With foreign debt payments requiring an additional 40% of export earnings, very little money remained to purchase parts, equipment, and supplies needed to improve the economy. By yearend 1982, foreign debt amounted to about $2 billion, which was equal to the value of 2 years of exports.[2] The overvalued cedi continued to plague the economy.

With the commissioning of the Kpong hydroelectric project, Ghana's electrical power capacity was increased to 1,060 megawatts. Ghana's Volta River Authority (VRA) and the Nigerian Electric Power Authority were studying the possibilities for linking their power systems through Benin and Togo.[3] Decreasing rainfall over the past 4 years caused the water level at the Akosombo Dam on the Volta River to drop to about 250 feet and compelled a cut in electric power to the Volta Aluminum Co. (VALCO) that curtailed its aluminum smelter production by 80,000 tons. VALCO was owned by Kaiser Aluminum & Chemical Corp. (90%) and Reynolds Metal Co. (10%).

PRODUCTION AND TRADE

In 1982, 80% of imports were from Western Europe, the United States, Canada, and Japan, with the remainder coming from other countries. Ghanaian exports followed the import pattern. Industrial diamond production declined to about 612,000 carats, the lowest level since Ghana gained independence in 1957. Gold production continued its declining trend, having dropped 37% from that of 1978 including an 11% decrease from that of 1981. The decline is attributed to deteriorating plants and equipment, a shortage of spare parts and trained personnel, and the low ore grades at the state mines. The Ghana National Manganese Corp. shipped 130,000 tons of manganese ore from its mine at Nsuta to Belgium, the United Kingdom, Ireland, Norway, Spain, and Japan.[4]

Table 1.—Ghana: Production of mineral commodities[1]

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Aluminum:					
Bauxite, gross weight metric tons	327,900	235,300	225,100	181,257	147,000
Metal, smelter, primary do	111,364	168,727	187,667	190,496	173,000
Cement, hydraulic thousand metric tons	489	248	294	401	400
Diamond:					
Gem[e] thousand carats	142	125	126	86	68
Industrial[e] do	1,281	1,101	1,023	750	612
Total do	1,423	1,226	1,149	[e]836	680
Gold thousand troy ounces	[r]466	[r]388	342	333	295
Iron and steel: Crude steel[e] metric tons	10,000	5,000	5,000	5,400	5,400
Manganese ore and concentrate, gross weight do	316,700	253,800	249,900	233,146	132,000
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	285	556	650	NA	NA
Refinery products:					
Gasoline do	2,231	[e]2,200	[e]1,830		
Jet fuel do	309	[e]300	[e]260		
Kerosine do	1,046	[e]1,000	926		
Distillate fuel oil do	2,455	[e]2,400	2,115	NA	NA
Residual fuel oil do	2,080	[e]2,000	NA		
Other do	137	[e]130	NA		
Refinery fuel and losses do	393	[e]390	NA		
Total do	8,651	[e]8,420	[e]7,200	NA	NA
Salt[e] metric tons	50,000	50,000	50,000	50,000	50,000
Silver, mine output, metal content thousand troy ounces	19	20	[e]18	17	14

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 28, 1983.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

COMMODITY REVIEW

METALS

Aluminum.—The Ghana Bauxite Co., owned 55% by the Government and 45% by British Aluminum Co. Ltd., had projected 1982 bauxite production at only 200,000 tons, which was far below a potential annual production of 400,000 tons. The reduced production resulted from factors such as depressed world bauxite markets and poor railway transport between the mine at Awaso and the Port of Takoradi and owing to the inability to obtain loans to rehabilitate the transport system.[5] Development of the extensive bauxite deposits at Kibi by a European consortium to produce an estimated 800,000 tons per year of alumina had been delayed.[6] VALCO shut down two of its five potlines around November 1 at the request of VRA because the very low water levels in Lake Volta greatly reduced the hydroelectric power generated at the Akosombo Dam. That power cutback reduced the plant capacity of 200,000 to about 120,000 tons per year.[7] Another 10- to 15-foot drop in water level could force the shutdown of both the aluminum smelter and the hydroelectric generating turbines. VRA also was reducing by 10% the electric power supplied to Togo and Benin, resulting in a loss of much needed revenue.

Gold.—For the year ending September 30, 1982, Ashanti Goldfields Corp. (Ghana) Ltd. (AGC) milled 758,980 tons of mixed quartz, sulfide, and bulk ores with an average grade of 0.35 troy ounce of gold per ton. Metallurgical difficulties with the highly carbonaceous portions of the ore kept overall recovery low at 83.4%. Work continued on underground development to expand gold output by 100,000 ounces per year by 1985. Expansion efforts were concentrated on rehabilitating the South shaft and sinking two new shafts. The new Nyankumasu shaft was down to the 2,600 level and could eventually extend to the 3,200 level. This shaft will open up promising new reserves to the south of the present main workings. The Adansi subvertical shaft from the 4,800 level was completed to the 5,200 level. The

new winder capacity will allow it to ultimately reach the 7,200 level. AGC ore reserves shown in the following table are based on a cutoff grade of 0.20 troy ounce of gold per ton.

The State Gold Mining Corp. (SGMC), which ran three low-grade mines at Prestea, Tarkwa, and Konongo and a dredging operation at Dunkwa, operated at only 25% capacity in 1982. Konongo was placed on a care and maintenance status after a brief operation. The low production level was attributed to a general deterioration of the physical plants and machinery due to age and difficulties in obtaining sufficient foreign exchange to purchase spare parts for the mines. A $57 million, 5-year rehabilitation program was developed to return SGMC to full capacity; however, capital availability constraints continued to be a problem.

Table 2.—Ghana: Gold production and reserves

Mine	Production (troy ounces)			1982 reserves		
	1980	1981	1982[p]	Metric tons	Grade (troy ounces per ton)	Gold (troy ounces)
Ashanti	232,036	252,498	223,733	[1]5,041,400	0.625	3,150,875
State Gold Mining Corp.:						
Prestea	64,018	40,586	34,741	[2]1,461,200	.295	431,612
				[3]2,993,600	.275	823,235
Tarkwa	38,999	32,528	31,771	[2]865,200	.284	245,450
				[3]12,750,000	.125	1,597,150
Konongo	536	934	200	[2]684,400	.266	182,355
				[3]80,200	.307	24,615
Dunkwa (dredges)	6,599	6,556	4,577	[2 4]401,486,900	[5]0.002- .004	1,591,000

[p]Preliminary.
[1]Measured reserves.
[2]Measured and indicated reserves.
[3]"Conjectural" or inferred ore reserves.
[4]Cubic yards.
[5]Troy ounces per cubic yard.

Sources: Ashanti Goldfields Corp. (Ghana) Ltd.
Ghana State Gold Mining Corp. Short Term Programme for Increased Gold Production. December 1982, 73 pp.

Manganese.—The manganese roasting and nodulizing plant for upgrading 30% manganese carbonate ore to a 50% contained manganese product at Nsuta was completed but not operational, owing to electrical problems and to the lack of crude oil to run it. The turnkey plant was constructed in 2-1/2 years by the Fuller Co. of Bethlehem, Pa., at a cost of over $27 million to produce between 1,100 and 1,500 tons of manganese per day. An estimated 2-year stockpile of manganese carbonate ore was set aside awaiting the startup of the plant, which potentially could earn about $24 million per year in exports.

NONMETALS

Cement.—Ghana produced about one-half of the cement that it used in 1982. The grinding plants at Tema and Takoradi with a 1.4-million-ton-per-year capacity obtained their clinker from the regional cement clinker complex, Ciments de l'Afrique de l'Ouest in Togo, which also supplied Togo and the Ivory Coast. The complex was funded primarily by the International Bank for Reconstruction and Development (World Bank).

Diamond.—The Government-owned Ghana Consolidated Diamonds Ltd. experienced a decrease in production of 19% as the original Akwatia Valley placer river gravel deposits essentially were depleted. Current mining was taking place within a thin Akwatia terrace gravel pay zone. The terrace gravels could produce diamonds for the next 10 years at 1981 production levels. However, increasing high production costs could affect the future viability of the operation. Additional resources of lower grade placer deposits averaging from 1.07 to 1.42 carats per cubic meter occur in the Birin Valley. These have been investigated under a United Nations Development Program

and would require substantial new investment to develop.

MINERAL FUELS

Petroleum.—The Ghanaian Government awarded a contract to Tanzer Natural Resources Associates, a consulting firm in New York, to help draft new petroleum legislation and to establish a national oil company that would oversee exploration and development. The Government favored production sharing of service contracts instead of concessions. Previously, concessions permitted a 25-year exclusive contract with two optional 10-year extensions and provided the Government a 20% participation in any commercial discovery, 12.5% royalty payments, and a 50% tax of net profits. Agri-Petco Co. operated the only producing field near Saltpond, in the central basin about 10 miles offshore. The field operator was Agri-Petco International Inc., Tulsa, Okla., a joint venture owned by Texas City Refining Inc., National Cooperative Refinery Association, and Indiana Farm Bureau Cooperative Association Inc. Agri-Petco planned to drill additional wells in the Saltpond area. Elsewhere, ongoing explorations were in the offshore Keta basin lagoon by Agri-Petco's Ghana subsidiary, Texas Pacific Corp.; in the Tano basin by the Phillips Petroleum Co., Ghana, operator for a group consisting of Azienda Generali Italiana Petroli S.p.A. (Agip) and Getty Oil International Ghana Inc.; and in an offshore area near the Ivory Coast by Agip, whose partners were Aracca Petroleum Corp., Oxoco International Inc., Texon Energy Corp., and Zapata Exploration Co. The Agip concession was about 150 miles from an oil discovery in Ivory Coast waters. Phillips found oil in its 1-X South Tano well that flowed 1,475 barrels of oil and 8.2 million cubic feet of gas per day. A second appraisal well drilled nearby found additional gas. The Geophysical Service Inc. of Houston was awarded a contract by Ghana to conduct an offshore seismic survey near the Togo border.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Ghanaian New cedi (Nc) to U.S. dollars at the rate of Nc1=US$0.36. Since the official exchange rate does not reflect the true value of the Ghanaian currency, the converted value must be viewed cautiously.

[3]Accra Daily Graphic. July 2, 1982, p. 1.

[4]Skillings' Mining Review. V. 72, No. 9, Feb. 26, 1983, p. 20.

[5]Metal Bulletin. No. 6692, May 28, 1982, p. 13.

[6]Mining Magazine. June 1982, p. 445.

[7]Metal Bulletin. No. 6752, Jan. 7, 1983, p. 19.

The Mineral Industry of Greece

By Walter G. Steblez[1]

In 1982, the Greek economy continued its downward trend. The gross national product declined by 0.5%, gross fixed investment declined by 10%, and unemployment by yearend was over 6% of the 3.7 million labor force. Although inflation dropped to 21%, from 25% in 1981, it was expected to remain above 20% because of high public sector deficit expenditures.

Greece's mineral industry was adversely affected by decreased demand for metals and ores and rising raw material and wage costs, as well as by underemployment. Only a few mineral industry projects were completed and their primary operating results were reportedly less than satisfactory.

The chief events in the country's mineral industry included the completion of the Tsigeli ferrochromium plant, the proposed expansion of the Bauxites Parnasse Mining Co. S.A.'s mining operation at Ghion, and a Soviet proposal to build an alumina plant near Itea.

Greece produces a wide variety of metallic and nonmetallic minerals, as well as mineral fuels, but is a ranking world producer only of bauxite, barite, and perlite, of which its share of world output was 4%, 1.3%, and 9%, respectively.

Government Policies and Programs.—One of the main policies of the Greek Government was the promotion of the public sector. Unprofitable, as well as marginally profitable, industries were subject to nationalization. The Société Minière Metallurgique de Larymna (Larco), Greece's sole nickel producer, was nationalized for this reason in 1982.

In June, Public Law 1116-81, a legislative package aimed at improving investment incentives in industry (including mining and metallurgy), was repealed and superceded by Public Law 1262, which introduced state participation in private investment programs. The legislation aimed at stimulating capital investment and allowed for maximum state grants for projects dealing with energy conservation, mineral and energy research, and technological improvement.

PRODUCTION

Although the aggregate production increase for mining for the first quarter of 1982 showed a 27.9% increase over that of 1981, yearend results showed production decreases in most areas of mining and mineral fuel extraction. Production of bauxite and alumina, mixed sulfides, magnesite, and nickel was less in 1982 than that of 1981. During the year, labor productivity in industry fell below 1981 levels and underutilized industrial plant capacity reached 23%.

The Greek mineral industry was both privately and publicly owned and operated. The principal private firms that operated mining and processing enterprises were the Bodossakis Group, mixed sulfides, iron and cupreous pyrites, lead and zinc concentrates, and nickel; the Eliopoulos-Kyriacopoulos Group, bauxite, barite, bentonite, perlite, and kaolin; the Scalistiris Group, magnesite, bauxite, chromite, and manganese refractories; Magnomin General Mining Co. S.A., magnesite and dead-burned magnesite; Mykobar S.A., barite, bentonite, and perlite; Aluminium de Grèce S.A., bauxite, alumina, aluminum ; and Helikon Bauxites-G. Barlos S.A., bauxite. Principal

Government agencies involved with mineral production and research were the Hellenic Industrial Development Bank (ETVA), asbestos, chromite, and alumina; the Hellenic Industrial Mining & Investment Co. (HIMIC), ferrochrome and ferronickel; the Institute of Geological and Mining Research (IGME), mineral research; the Public Petroleum Co. (DEP), petroleum research; and the Public Power Corp., power industry and lignite mining.

Two companies were partially nationalized: the Companie Française des Mines du Laurium S.A.F, a lead-silver producer formerly owned by Société Minière et Metallurgique de Peñarroya of France, now Government-owned, and Larco of the Bodossakis Group, a nickel producer, of which the Government of Greece is now the major stockholder. Reportedly, uncertainty generated by the Government's nationalization policy negatively affected investments in the mineral industry and the economy as a whole. Strikes in certain mining sectors also had a negative impact on investment and production.

Table 1.—Greece: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite, gross weight thousand tons	2,663	2,812	3,286	3,216	[3]2,853
Alumina, gross weight do	477	495	494	490	[3]420
Metal:					
Primary	143,800	140,830	146,500	147,000	147,000
Secondary	5,800	6,500	7,116	7,000	7,000
Chromium:					
Chromite:					
Run-of-mine ore	71,000	86,843	77,855	[e]80,000	80,000
Marketable products:					
Direct-shipping ore[e]	7,000	10,000	8,000	8,000	8,000
Concentrate	30,300	34,767	34,568	[e]34,600	34,000
Copper, mine output, metal content	1,500	--	[e]100	[e]100	--
Iron and steel:					
Iron ore and concentrate, nickeliferous:[4]					
Gross weight thousand tons	1,685	1,832	1,451	[e]1,400	1,400
Iron content do	725	788	624	[e]600	610
Metal:					
Pig iron do	600	328	[e]350	[e]350	350
Ferronickel	55,137	54,192	51,407	[e]51,000	51,000
Steel, crude thousand tons	936	1,000	[r]935	909	[3]910
Semimanufactures[5] do	[e]650	1,450	NA	NA	NA
Lead:					
Mine output, metal content	20,300	21,700	20,504	[e]21,000	21,000
Metal, refined:[6]					
Primary	15,600	15,640	21,067	20,065	21,000
Secondary	[e]5,600	6,000	4,000	4,000	4,000
Manganese, gross weight:					
Ore, crude	81,068	77,360	60,050	64,517	63,700
Concentrate	7,010	5,700	5,555	5,800	5,500
Nickel:					
Ni content of nickeliferous iron ore[7]	18,535	20,152	15,237	15,600	15,200
Ni content of alloys	14,192	[e]18,900	13,880	12,700	12,500
Silver:					
Mine output, metal content thousand troy ounces	1,360	1,752	1,672	[e]1,600	1,500
Metal content of alloys[e] do	500	500	NA	NA	NA
Tin metal, secondary[e]	30	30	45	45	40
Zinc:					
Mine output, metal content	25,600	23,200	27,100	27,000	22,000
Metal, including secondary	12	--	300	NA	NA
NONMETALS					
Abrasives, natural: Emery	8,000	9,300	9,300	[e]9,300	9,300
Asbestos:[e]					
Ore	40	NA	NA	20,000	100,000
Processed	--	--	--	--	100,000
Barite:					
Crude ore	110,838	109,344	98,529	115,768	116,000
Concentrate	44,691	48,007	48,200	47,014	47,000
Cement, hydraulic thousand tons	11,280	12,098	13,150	[e]13,500	13,500

See footnotes at end of table.

Table 1.—Greece: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Clays:					
Bentonite:					
Crude	408,729	495,176	501,878	311,947	312,000
Processed	279,788	373,304	362,013	185,627	186,000
Kaolin:					
Crude	47,648	32,803	42,546	[e]42,500	42,500
Processed	12,777	9,485	11,489	[e]11,000	11,000
Fluorspar, grade unspecified	610	360	400	292	300
Gypsum and anhydrite	544,837	604,299	[e]460,000	[e]500,000	500,000
Magnesite:					
Crude thousand tons	975	1,219	1,167	825	800
Dead-burned	284,509	392,489	397,962	274,939	270,000
Caustic-calcined	94,330	112,172	114,000	81,714	80,000
Nitrogen: N content of ammonia	229,000	287,000	226,000	255,000	[3]254,800
Perlite:					
Crude	221,277	279,660	278,912	253,780	245,000
Screened	150,392	171,014	147,654	131,750	130,000
Pozzolan (Santorin earth) thousand tons	[r]1,345	[r]1,241	[e]1,500	1,482	1,500
Pumice	[r]1,088	[r]944	[e]630,000	620,585	625,000
Pyrites, gross weight	146,870	150,951	147,298	[e]147,000	147,000
Salt, all types thousand tons	133	135	121	[e]120	120
Silica (probably silica sand)	26,162	27,000	[e]28,000	[e]28,000	28,000
Sodium compounds:					
Sodium sulfate	6,280	7,610	10,870	[e]11,000	11,500
Sodium carbonate[e]	1,000	1,000	1,000	1,000	1,000
Stone: Marble cubic meters	250,000	NA	NA	250,000	NA
Sulfur:					
S content of pyrites thousand tons	61	63	61	60	60
Byproduct of petroleum do.	3	3	4	7	8
Talc and steatite	[r]1,832	[r]5,112	1,460	[e]1,400	1,500
MINERAL FUELS AND RELATED MATERIALS					
Coal including briquets:					
Lignite thousand tons	21,779	23,617	23,207	27,107	[3]26,843
Lignite briquets do.	73	70	97	110	[3]108
Coke:					
Coke oven do.	300	[e]310	[e]300	310	[3]306
Gashouse do.	12	15	15	15	[3]16
Gas:					
Manufactured, gasworks million cubic feet	270	10	12	12	12
Natural do.	NA	NA	NA	1,351	[3]4,416
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	--	--	--	1,538	[3]7,618
Refinery products:					
Gasoline do.	10,668	10,812	9,690	13,277	[3]14,952
Jet fuel do.	5,408	10,064	10,632	12,976	[3]13,504
Kerosine do.	310	348	333	357	[3]332
Distillate fuel oil do.	21,559	26,363	27,505	29,407	[3]29,479
Residual fuel oil do.	35,418	46,679	41,772	45,841	[3]41,878
Lubricants do.	731	756	535	618	[3]687
Other do.	6,658	11,759	10,240	3,400	[3]3,349
Refinery fuel and losses do.	4,789	5,852	4,060	3,465	[3]4,969
Total do.	85,541	112,633	104,767	109,341	[3]109,150

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Sept. 9, 1983.

[2]In addition to the commodities listed, a variety of other crude construction materials (clays, sand and gravel, and stone) is produced, but output is not reported and available information is inadequate to make reliable estimates of output levels. Cobalt is also produced and is included with "Nickel."

[3]Reported figure.

[4]Ni content is also reported under "Nickel."

[5]Black sheet, galvanized sheet, reinforcing bars, and wire only.

[6]Includes antimonial lead and hard lead.

[7]Also includes Co content.

TRADE

In 1982, Greece's overall trade position actually deteriorated despite an improved balance-of-payment position. Improvement of the country's balance-of-payment deficit was chiefly due to a reduction in fuel imports by about 25%, but this reduction was compensated by a Government policy allowing drawing down of the country's oil stocks.

Although the country's major mineral trading partners were fellow members of the European Economic Community (EEC), Greece, after a trade decline in 1981, continued to maintain and promote commercial interests with the centrally planned economies of the Council for Mutual Economic Assistance (CMEA). Greek firms such as Bauxites Parnasse of the Eliopoulos-Kyriacopoulos Group and the Mamidakis Concern had been conducting long-term business with the U.S.S.R. on bauxite exports and petroleum imports, respectively. In 1982, commercial discussions were conducted with the U.S.S.R. on the extension of the Soviet gas pipeline and electric power grid through Bulgaria to Greece, Soviet assistance for the construction of a nonferrous metallurgical site in Greece, and purchases of Greek alumina. Likewise, commercial agreements that included the sale of Greek mineral commodities were negotiated with Romania, Bulgaria, and several other CMEA countries.

Table 2.—Greece: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	2,340	1,588	--	U.S.S.R. 579; Romania 376; Netherlands 188; Italy 125.
Oxides and hydroxides	203,175	159,000	--	All to Netherlands.
Metal including alloys:				
Scrap	1,013	427	--	France 238; Belgium-Luxembourg 83; Netherlands 43.
Unwrought	60,245	69,225	--	France 28,666; Italy 26,075; Lebanon 8,649.
Semimanufactures	32,786	26,705	120	Saudi Arabia 7,457; West Germany 5,934; Jordan 1,983.
Chromium: Ore and concentrate	32,319	15,885	--	West Germany 12,490; Italy 980; France 840.
Copper:				
Matte and speiss including cement copper	--	20	--	All to Belgium-Luxembourg.
Metal including alloys:				
Scrap	851	1,494	--	France 539; Belgium-Luxembourg 498; West Germany 224.
Unwrought	129	1	--	All to Libya.
Semimanufactures	10,142	12,350	120	West Germany 2,567; Libya 2,210; Iran 1,667.
Iron and steel:				
Iron ore and concentrate, pyrite, roasted	22,603	14,500	--	All to Kenya.
Metal:				
Scrap	859	819	--	Italy 562; Netherlands 174; France 83.
Pig iron, cast iron, related materials	16	20	--	All to Cyprus.
Ferroalloys, ferronickel	49,468	49,350	9,841	West Germany 26,507; Belgium-Luxembourg 6,969; Sweden 2,696.
Steel, primary forms	69,072	3,142	--	India 3,124; Saudi Arabia 17.
Semimanufactures:				
Bars, rods, angles, shapes, sections	167,712	189,725	1	Egypt 51,903; Syria 32,578; Tunisia 26,910.
Universals, plates, sheets	173,120	45,509	15,780	Yugoslavia 15,192; Cyprus 3,080; Albania 2,385.
Hoop and strip	10,788	10,898	--	Syria 6,905; West Germany 1,594; Italy 490.
Rails and accessories	75	1	--	All to Libya.
Wire	4,382	2,337	--	Libya 1,372; Bulgaria 338; Cyprus 204.
Tubes, pipes, fittings	96,164	124,987	58,608	Libya 34,581; Cyprus 15,686; Iran 8,208.
Castings and forgings, rough	11	662	--	West Germany 624; Lebanon 14; Libya 12.

Table 2.—Greece: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	39,124	21,580	--	U.S.S.R. 7,300; Bulgaria 5,430; Belgium-Luxembourg 5,000.
Metal including alloys:				
Scrap	235	361	--	All to Belgium-Luxembourg.
Unwrought	r530	1,455	--	Italy 700; Yugoslavia 400; Turkey 354.
Semimanufactures	5	21	--	Saudi Arabia 20.
Manganese:				
Ore and concentrate, metallurgical-grade	750	1,500	--	All to Spain.
Oxides	13,126	9,238	1,431	Belgium-Luxembourg 3,088; U.S.S.R. 1,151; Republic of South Africa 667.
Nickel: Metal including alloys:				
Scrap	90	393	--	Netherlands 376; United Kingdom 17.
Semimanufactures	981	479	--	Netherlands 478.
Silver:				
Waste and sweepings value, thousands	$199	$214	--	All to Belgium-Luxembourg.
Metal including alloys, unwrought and partly wrought do	$2,102	$2,204	--	France $1,990; West Germany $130; Switzerland $82.
Tin:				
Ore and concentrate	30,325	--		
Metal including alloys:				
Unwrought	--	2	--	All to Saudi Arabia.
Semimanufactures	8	--		
Uranium and/or thorium: Ore and concentrate value, thousands	$205	--		
Zinc:				
Ore and concentrate	44,741	42,100	--	France 13,200; Belgium-Luxembourg 11,800; Italy 8,000.
Oxides	7	(1)	--	All to Bulgaria.
Metal including alloys:				
Scrap	629	398	--	West Germany 204; Italy 121; Belgium-Luxembourg 39.
Unwrought	--	2	--	All to Cyprus.
Semimanufactures	42	44	--	Italy 23; Belgium-Luxembourg 21.
Other:				
Ores and concentrates	942	124,288	--	Romania 70,000; Italy 19,138; United Kingdom 17,650.
Ashes and residues	88,208	60,849	--	Saudi Arabia 40,300; Mali 8,924; Egypt 5,772.
Base metals including alloys, all forms	106	72	--	Netherlands 67; Saudi Arabia 5.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	412,923	271,743	92,482	United Kingdom 139,172; West Germany 34,700; Spain 2,000.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$79	$326	$305	All to West Germany.
Grinding and polishing wheels and stones	55	35	1	France 9; Turkey 9; Egypt 5.
Barite and witherite	55,259	822	--	Libya 802; Egypt 20.
Cement thousand tons	5,222	5,996	--	Saudi Arabia 2,042; Egypt 1,731; Nigeria 740.
Chalk	619	631	--	Saudi Arabia 396; Cyprus 157.
Clays and clay products:				
Crude, unspecified	485,449	768,426	--	Libya 154,255; United Kingdom 113,293; Sweden 110,650.
Products:				
Nonrefractory	18,154	9,503	(1)	Saudi Arabia 2,650; Egypt 2,311; Jordan 1,142.
Refractory including nonclay brick	43,340	37,781	--	France 7,261; West Germany 3,898; Romania 3,741.
Diatomite and other infusorial earth	--	1	--	NA.
Fertilizer materials:				
Crude, n.e.s	943	2,239	--	Saudi Arabia 2,048; Jordan 191.
Manufactured:				
Ammonia	--	1	--	All to Romania.
Potassic	500	18,800	--	Algeria 12,700; Libya 4,700; Cyprus 1,000.
Unspecified and mixed	71,944	40,553	--	China 40,500; Cyprus 40.
Graphite, natural	--	1	--	All to Cyprus.
Gypsum and plaster	19	162	--	Cyprus 106; Cameroon 50.

See footnotes at end of table.

Table 2.—Greece: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Lime	130	234	--	Cameroon 224; Saudi Arabia 10.
Magnesium compounds: Magnesite	423,809	280,863	4,355	West Germany 71,449; Italy 40,841; Yugoslavia 37,502.
Pigments, mineral: Iron oxides and hydroxides, processed	--	1	--	All to Lebanon.
Precious and semiprecious stones other than diamond: Synthetic -- value, thousands	$75	--	--	
Salt and brine	--	1,003	--	Bulgaria 1,000.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	--	(1)	--	All to Libya.
Sodium hydroxide	--	105	--	Sweden 100; Saudi Arabia 5.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	51,452	37,249	380	Lebanon 9,447; Saudi Arabia 7,734; Italy 5,722.
Worked	53,328	57,937	166	Saudi Arabia 28,083; Libya 8,876; Kuwait 4,843.
Gravel and crushed rock	15,804	22,179	--	Libya 21,880; Cyprus 238.
Quartz and quartzite	27,013	2,129	--	Italy 2,000; Cyprus 129.
Sand other than metal-bearing	12	50	--	Libya 25; Iraq 10; Saudi Arabia 6.
Sulfur:				
Elemental, crude including native and byproduct	2,046	5,758	--	Turkey 4,650; Bulgaria 1,000; United Kingdom 72.
Sulfuric acid	162,927	32,839	--	Yugoslavia 17,500; Turkey 6,000; Algeria 5,000.
Talc, steatite, soapstone, pyrophyllite	--	525	--	Israel 500; Cyprus 20.
Other:				
Crude	285,748	215,368	4	West Germany 85,375; France 58,660; United Kingdom 23,176.
Slag and dross, not metal-bearing	9,007	4,228	--	Saudi Arabia 2,230; West Germany 1,500; Netherlands 219.
Oxides and hydroxides of barium, magnesium, strontium	6,126	(1)	--	All to Libya.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	33,572	15,169	--	Saudi Arabia 6,864; Libya 5,583; Cyprus 1,150.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	45	--		
Coke and semicoke	22,000	320	--	All to Libya.
Peat including briquets and litter	--	337	--	All to Saudi Arabia.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	51	366	--	Lebanon 99; Italy 65; France 60.
Gasoline do	1,222	197	--	France 173; Spain 13; Tunisia 9.
Mineral jelly and wax do	130	79	--	West Germany 54; Morocco 25.
Kerosine and jet fuel do	5,113	2,960	1,617	Saudi Arabia 252; Egypt 178; United Kingdom 112.
Distillate fuel oil do	2,904	2,098	1,773	Saudi Arabia 153; Panama 36; United Kingdom 16.
Lubricants do	400	143	2	Egypt 82; Italy 19; Lebanon 9.
Residual fuel oil do	10,528	3,021	117	Italy 1,175; Lebanon 333; Libya 251.
Bitumen and other residues do	--	(1)	--	All to Cyprus.
Bituminous mixtures do	1	13	--	Libya 9; Cyprus 3.
Tars and other crude chemicals derived from coal, gas, and petroleum	--	150	--	Syria 146.

rRevised. NA Not available.
1Less than 1/2 unit.

Table 3.—Greece: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	2,080	1,661	1,603	West Germany 58.
Aluminum:				
Ore and concentrate	6,502	--		
Oxides and hydroxides	220	337	94	France 88; United Kingdom 65; West Germany 64.
Metal including alloys:				
Scrap	61	168	--	Hungary 102; Saudi Arabia 37; France 28.
Unwrought	154	2,840	--	West Germany 1,053; Romania 534; Yugoslavia 489.
Semimanufactures	4,000	4,388	808	West Germany 1,087; France 649; Italy 602.
Chromium:				
Ore and concentrate	6,932	3,952	--	Republic of South Africa 3,917; West Germany 25.
Oxides and hydroxides	133	112	--	West Germany 67; Italy 26; Belgium-Luxembourg 11.
Cobalt: Oxides and hydroxides	2	(1)	--	Mainly from West Germany.
Copper:				
Matte and speiss including cement copper	(1)	3,665	--	Belgium-Luxembourg 1,366; Chile 1,265; Zambia 398.
Metal including alloys:				
Scrap	355	1,909	53	Zaire 568; Belgium-Luxembourg 557; Zambia 502.
Unwrought	24,958	20,030	--	Zambia 7,878; Chile 5,005; Zaire 2,281.
Semimanufactures	799	2,581	465	Italy 972; West Germany 566; United Kingdom 229.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	288,463	95	--	Sweden 85; France 10.
Metal:				
Scrap	239,004	288,145	133,879	U.S.S.R. 80,416; Netherlands 37,464; Algeria 14,869.
Pig iron, cast iron, related materials	r10,283	16,572	--	U.S.S.R. 4,116; Brazil 3,964; West Germany 3,818.
Ferroalloys:				
Ferromanganese	2,664	2,628	--	Portugal 1,270; Spain 551; Norway 402.
Unspecified	11,267	8,633	--	France 3,253; Portugal 2,492; Belgium-Luxembourg 1,407.
Steel, primary forms	630,584	208,435	--	France 98,016; Italy 41,590; West Germany 22,152.
Semimanufactures:				
Bars, rods, angles, shapes, sections	207,360	194,848	77	France 39,395; West Germany 33,332; Italy 31,437.
Universals, plates, sheets	208,611	217,757	3,367	France 37,387; West Germany 36,570; United Kingdom 24,121.
Hoop and strip	121,632	131,093	8	West Germany 42,489; France 25,907; Belgium-Luxembourg 15,583.
Rails and accessories	1,118	3,705	--	Poland 1,418; Belgium-Luxembourg 887; West Germany 417.
Wire	8,405	10,167	(1)	West Germany 3,309; Belgium-Luxembourg 2,462; Italy 1,853.
Tubes, pipes, fittings	31,318	40,413	84	West Germany 16,453; France 5,331; Japan 4,070.
Castings and forgings, rough	2,083	950	(1)	Belgium-Luxembourg 469; France 222; Italy 181.
Lead:				
Ore and concentrate	7,022	--		
Oxides	251	88	--	France 69; West Germany 12.
Metal including alloys:				
Scrap	--	3	--	All from Denmark.
Unwrought	7,807	6,059	--	Bulgaria 2,959; Spain 1,000; United Kingdom 704.
Semimanufactures	13	12	--	United Kingdom 5; West Germany 4; Netherlands 2.

See footnotes at end of table.

Table 3.—Greece: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Unwrought	499	303	--	France 235; Norway 59; Switzerland 3.
Semimanufactures	4	9	1	Austria 5; West Germany 2.
Manganese:				
Ore and concentrate, metallurgical-grade	29,278	5	--	All from West Germany.
Oxides	108	126	--	Belgium-Luxembourg 125.
Mercury 76-pound flasks	87	58	--	Belgium-Luxembourg 29; West Germany 29.
Metalloids: Unspecified	632	360	--	France 347; West Germany 13.
Molybdenum: Metal including alloys, all forms	1	2	--	Mainly from Belgium-Luxembourg.
Nickel:				
Matte and speiss	--	1	--	All from United Kingdom.
Metal including alloys:				
Scrap	1	--		
Unwrought	182	41	--	Finland 19; Netherlands 7; U.S.S.R. 7.
Semimanufactures	58	46	1	United Kingdom 20; West Germany 16; Italy 3.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$1,595	$577	$26	West Germany $446; Switzerland $52; Kenya $15.
Silver: Metal including alloys, unwrought and partly wrought do.	$6,443	$4,464	$46	Switzerland $2,520; United Kingdom $1,239; West Germany $417.
Tin: Metal including alloys:				
Unwrought	468	417	2	Malaysia 201; Bolivia 124; West Germany 20.
Semimanufactures	19	19	(1)	West Germany 9; United Kingdom 9.
Titanium: Oxides	680	663	(1)	West Germany 305; France 196; Belgium-Luxembourg 105.
Tungsten: Metal including alloys, all forms	5	1	(1)	Mainly from West Germany and Netherlands.
Uranium and/or thorium: Ore and concentrate value, thousands	$22	$28	--	All from Netherlands.
Zinc:				
Oxides	606	563	(1)	France 264; Netherlands 174; Belgium-Luxembourg 72.
Metal including alloys:				
Scrap	23	--		
Unwrought	18,812	18,330	--	Zaire 4,975; Netherlands 3,489; United Kingdom 2,223.
Semimanufactures	154	220	--	West Germany 87; Belgium-Luxembourg 83; U.S.S.R. 30.
Other:				
Ores and concentrates	7,498	8,218	--	Italy 5,892; China 1,001; Australia 915.
Oxides and hydroxides	--	176	--	France 66; Norway 44; West Germany 23.
Ashes and residues	95	289	--	United Kingdom 135; Ivory Coast 101; Nigeria 20.
Base metals including alloys, all forms	193	169	(1)	France 72; Republic of South Africa 50; West Germany 35.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	39	44	2	Italy 27; West Germany 13.
Artificial: Corundum	512	407	(1)	West Germany 180; France 162; Poland 38.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$3,215	$3,192	$631	West Germany $1,816; Belgium-Luxembourg $367; Ireland $335.
Grinding and polishing wheels and stones	277	387	7	Italy 172; West Germany 71; Austria 47.
Asbestos, crude	14,181	14,666	--	Cyprus 4,141; Republic of South Africa 3,765; Canada 3,232.
Barite and witherite	137	3,430	--	Italy 1,200; United Kingdom 1,100; Ireland 1,050.

See footnotes at end of table.

Table 3.—Greece: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Boron materials:				
Crude natural borates	600	301	301	
Oxides and acids	214	218	--	France 133; Italy 56; Turkey 25.
Cement	770	805	11	Italy 662; Denmark 69; West Germany 28.
Chalk	580	518	--	France 188; Austria 144; United Kingdom 57.
Clays and clay products:				
Crude, unspecified	113,902	79,531	866	United Kingdom 51,194; Czechoslovakia 6,169; Yugoslavia 5,229.
Products:				
Nonrefractory	32,454	36,068	--	Italy 34,836; West Germany 671; France 280.
Refractory including nonclay brick	29,433	23,654	79	France 5,894; West Germany 5,041; Czechoslovakia 2,830.
Cryolite and chiolite		6	--	Denmark 5; West Germany 1.
Diamond:				
Gem, not set or strung value, thousands	--	$13	--	All from West Germany.
Industrial do	--	$15	$4	Do.
Diatomite and other infusorial earth	521	1,063	347	Hungary 213; West Germany 212; Iceland 100.
Feldspar, fluorspar, related materials:				
Unspecified	16,044	13,299		Kenya 6,748; Italy 3,358; Norway 1,077.
Fertilizer materials:				
Crude, n.e.s	1	403		All from Israel.
Manufactured:				
Ammonia	68,490	49,864	1	U.S.S.R. 31,369; West Germany 10,008; Romania 5,304.
Nitrogenous	73,547	65,456		Romania 31,372; Italy 17,171; Bulgaria 9,134.
Phosphatic	--	(1)	--	All from Switzerland.
Potassic	50,475	5,079		West Germany 3,277; Belgium-Luxembourg 1,300; France 502.
Unspecified and mixed	3,538	929	54	West Germany 719; Netherlands 84; United Kingdom 20.
Graphite, natural	194	379	--	Czechoslovakia 145; Austria 144; Italy 56.
Gypsum and plaster	1,175	1,244	--	Italy 773; West Germany 358; France 79.
Halogens: Unspecified	2	2	--	West Germany 1; Netherlands 1.
Lime	--	21	--	All from West Germany.
Magnesium compounds: Magnesite	881	275	2	Austria 83; France 78; West Germany 54.
Mica:				
Crude including splittings and waste	272	193	--	Austria 97; India 62; Norway 16.
Worked including agglomerated splittings	10	11	--	Italy 3; Belgium-Luxembourg 2; Japan 1.
Phosphates, crude	244,261	218,771	--	Tunisia 79,752; Senegal 68,944; Israel 33,651.
Pigments, mineral: Iron oxides and hydroxides, processed	2,103	1,676	32	West Germany 1,309; Italy 138; Spain 77.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$191	$76	$10	Thailand $23; Brazil $15; India $6.
Synthetic do	$14	$5	--	France $3; Switzerland $2.
Pyrite, unroasted	69,977	46,582	--	Spain 24,137; Cyprus 15,210; U.S.S.R. 7,230.
Salt and brine	39,241	26,226	5	Italy 23,538; France 1,445; Tunisia 1,031.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	295	366	--	Italy 138; West Germany 118; France 89.
Sodium carbonate, natural and manufactured	31,025	31,944	--	Belgium-Luxembourg 8,260; Poland 6,611; Bulgaria 5,692.
Sodium hydroxide	60,418	31,458	1	France 27,222; Bulgaria 3,515; Yugoslavia 379.

See footnotes at end of table.

Table 3.—Greece: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,843	2,657	--	Turkey 950; Pakistan 754; Italy 685.
Worked	336	407	(1)	Italy 350; Mexico 31; Belgium-Luxembourg 12.
Dolomite, chiefly refractory-grade	2,372	1,404	--	Italy 1,249; Austria 94; West Germany 41.
Gravel and crushed rock	791	1,254	--	Italy 626; France 226; West Germany 196.
Limestone other than dimension	30	20	--	All from United Kingdom.
Quartz and quartzite	36	15	--	West Germany 12; Spain 3.
Sand other than metal-bearing	126,993	82,502	2	Belgium-Luxembourg 67,182; Bulgaria 11,509; Yugoslavia 1,532.
Sulfur:				
Elemental:				
Crude including native and byproduct	41,187	61,888	--	Poland 50,806; France 11,071.
Colloidal, precipitated, sublimed	49	102	--	West Germany 74; Italy 18; France 10.
Sulfuric acid	58	23	--	West Germany 11; Netherlands 7; Italy 5.
Talc, steatite, soapstone, pyrophyllite	2,267	1,601	2	Belgium-Luxembourg 642; France 366; Italy 263.
Other:				
Crude	1,496	1,025	13	Gabon 358; Republic of South Africa 200; Netherlands 195.
Slag and dross, not metal-bearing	121,174	367,684	--	Italy 340,064; Egypt 19,297; Netherlands 4,116.
Oxides and hydroxides of barium, magnesium, strontium	57	31	9	Italy 16; West Germany 6.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	2,528	2,485	6	Italy 936; France 918; Romania 403.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	22	66	--	France 48; United Kingdom 15.
Carbon: Carbon black	798	4,263	1	Italy 3,023; West Germany 620; Spain 368.
Coal:				
Anthracite and bituminous	480,684	168,401	51,670	Republic of South Africa 85,780; Poland 15,802; U.S.S.R. 12,771.
Briquets of anthracite and bituminous coal	408	100	--	All from Czechoslovakia.
Lignite including briquets	--	22	--	All from U.S.S.R.
Coke and semicoke	31,732	23,568	--	Italy 6,873; United Kingdom 5,626; Czechoslovakia 3,613.
Peat including briquets and litter	3,337	3,775	--	U.S.S.R. 2,272; Netherlands 1,368; Norway 51.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	75,370	65,711	16	Egypt 17,705; Saudi Arabia 16,368; Libya 13,847.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	46	4,710	46	France 4,014; Netherlands 650.
Gasoline do	45,883	367,413	--	Italy 166,379; Albania 60,546; France 59,687.
Mineral jelly and wax do	10,900	8,240	(1)	West Germany 5,580; Hungary 606; Netherlands 504.
Kerosine and jet fuel do	154,267	99,053	--	Italy 64,589; France 32,488; Netherlands 884.
Distillate fuel oil do	731,990	1,107,430	--	U.S.S.R. 649,759; Italy 277,699; France 82,597.
Lubricants do	500,579	384,937	4,067	Netherlands 175,322; Italy 56,154; France 36,827.
Residual fuel oil do	433,779	251,462	--	Saudi Arabia 82,624; U.S.S.R. 60,646; Italy 32,261.
Bitumen and other residues do	120,164	12,762	--	Albania 12,320; Belgium-Luxembourg 351; West Germany 85.
Bituminous mixtures do	1,557	14,665	73	United Kingdom 13,617; West Germany 497; Italy 236.
Petroleum coke do	439,384	675,873	480,568	France 163,592; Syria 31,713.
Tars and other crude chemicals derived from coal, gas, and petroleum	7,379	19,122	28	France 8,109; Italy 7,405; United Kingdom 1,087.

r Revised.
1 Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—Greece's production of bauxite, alumina, and aluminum was cut back from anticipated yearend goals in 1982 because of depressed world market conditions. Major trends in the bauxite mining industry included planned facility expansion at the Bauxites Parnasse mining operations in the Parnassos-Ghion Mountains, 200 kilometers northwest of Athens. The company, which is the largest bauxite producer in the EEC, with approximately 58% of total domestic bauxite mining capacity, anticipated increased alumina demand because of a proposed $500 million,[2] 600,000-ton-per-year alumina plant, Aghra Euthemia, near Itea. The proposed Bauxites Parnasse Mine expansion, if implemented, would raise the company's annual production capacity from 2,000,000 to 3,000,000 metric tons per year, at a cost of $75 million. About 44% of the cost would be earmarked for construction and installation, 36% for infrastructure and transport facilities, 11% for exploration, and 9% for equipment. The project would also increase the company's work force by 40%. The company's 60% to 40% open pit to underground production ratio was expected to be reversed in the near future. Major importers of Greek bauxite, as in past years, were the U.S.S.R. and Romania.

The proposed alumina plant was the subject of a feasibility study contracted to the U.S.S.R. by ETVA and completed by mid-1982. Results of the study were circulated for outside evaluation. The major issues were the disposal of the alumina produced and construction financing. The U.S.S.R. agreed to purchase over 200,000 tons per year of alumina over an unspecified time period, with another 100,000 tons to be taken by Bulgaria. The outstanding question, as in 1981, was the manner in which additional alumina production would be marketed and disposed of.

Other events included an increase in capacity at the Aluminium de Grèce alumina plant by 100,000 tons per year and an EEC loan to the same company through ETVA to improve productivity at the company's aluminum smelter.

Chromite.—Mine development at the Skoumtsa chromium deposits continued. Exploratory work conducted by IGME at Vourinos, 40 kilometers southwest of Kozáni, resulted in finding an additional 300,000 tons of chromite, which brought total proven reserves in the Skoumtsa mining area to 1 million tons, sufficient to last 15 years at a 30,000-ton-per-year ferrochrome production rate. Exploration plans aim at securing chromite reserves for 20 years. A $65 million expansion program was planned at the Skoumtsa underground mine to raise production from 55,000 to 250,000 tons per year, and construction of a new 60,000-ton-per-year concentrator was begun to replace the old 13,000-ton-per-year unit; it would produce 48% Cr_2O_3 grade concentrate with a 3.1:1 chrome to iron ratio. Both facilities were expected to start operations by early 1983. The concentrate was to be fed to the Tsigeli 40,000-ton-per-year ferrochromium plant, owned by the Government-controlled Hellenic Ferroalloy S.A., which was completed in 1982 and scheduled for full operation by early 1983. Interest by the EEC in Greece's chromium mining and metallurgy resulted in a $10 million financing package for development in this area.

Iron and Steel.—Developments included the completion of a feasibility study for the construction of a 60,000-ton-per-year special steel plant. If completed, the plant would cost about $130 million and would draw its raw material base from the country's new ferrochromium plant as well as from ferronickel production. Two-thirds of the special steel would be sold for export and one-third would be sold to the domestic market. The U.S.S.R. also expressed interest in promoting Greek stainless steel operations during the year. Negotiations were reportedly conducted with the Greek company E. Karakikolas Sa-Beky on a cooperative agreement that would establish a $300 million steelworks near Salonika in northern Greece. The plant would have a design capacity of 130,000 to 150,000 tons per year of bars and flat rolled products. A large but unspecified percentage of the plant's output would be sold to the U.S.S.R. for an undetermined length of time. It was also reported that during the year the installed capacity of Hellenic Steel Co. was doubled.

Lead and Zinc.—The Aegean Metallurgical Industries S.A., an ETVA subsidiary, submitted another plan for the construction of a long-proposed lead-zinc smelter. The proposal called for the roughly $500 million integrated sulfide smelter to be built in eastern Chalkidiki on the Gulf of Ierissos, close to the Kassandra mines, the proposed raw material source. The smelter would produce annually about 40,000 tons each of lead and zinc and about 180,000 tons

of sulfuric acid. Additionally, 96,500 troy ounces of gold, 860,000 troy ounces of silver, and 200 tons of cadmium, plus arsenic and other byproducts, would be recovered. In anticipation of the proposed plant's feed requirements, the Kassandra mining operation, owned by the Hellenic Chemical Products and Fertilizers Co. of the Bodossakis Group, proceeded with a $20 million expansion program to raise the capacity of the Olympus Mine from 300,000 to 800,000 metric tons of ore per year. The capacity at the other two Kassandra mines would remain at 550,000 tons per year.

Expansion at the Olympus Mine was to include the development of a 400-meter vertical shaft to the lower part of the ore body, the addition of an underground primary crusher, skip hoisting facilities, and new trackless underground equipment. The ore bodies at the Kassandra mines are a hypothermal to metathermal type with mineralization occurring in veins or concentrations in marble horizons within metamorphic rocks. Measured reserves were about 20 million tons of ore containing 3.5% lead, 4.5% zinc, 17% sulfur, 3.85 troy ounces per ton of silver, and 0.18 troy ounce per ton of gold.

Production results for the year were reportedly poor owing to depressed market prices and the temporary shutdown of the Lavrion mining and metallurgical operations. The production of mixed sulfides at the Kassandra mines declined by 10% in respect to that of 1981.

Nickel.—The Greek nickel mining and processing industry experienced another difficult year because of depressed markets. Adding to this burden was a 4-month-long strike at Larco, Greece's only nickel and ferronickel producer. Production was halted during this period resulting in an output far below that of 1981. Negotiations begun in 1981 between Larco and the Government of Greece on nationalization resulted in majority stock ownership of the nickel producer by the Government.

Table 4.—Greece: Metallic mining and processing industries

Commodity	Major operating companies (ownership)	Location of main facilities	Capacity (thousand tons per year)	Share of domestic capacity (percent)
Alumina	Aluminium de Grèce S.A	Aspra Spritia, Distomon in Boeotia.	400	100
Aluminum	do	do	150	100
Bauxite	Bauxites Parnasse Mining Co. S.A. (Eliopoulos-Kyriacopoulos Group).	Open pit and underground mines in the Parnassos-Ghion area.	2,000	58
	Eleusis Bauxites Mines, Mining-Industrial and Shipping Inc. (Scalistiris Group).	Mines near Eleusis, Lamia, Itea, Kymi.	460	13
	Helikon Bauxites-G. Barlos S.A.	Mines at Helikon	360	11
	Aluminium de Grèce subsidiaries:			
	Delphi-Distomon S.A. (open cast and underground mines).	Delphi-Distomon area	600	17
	Hellenic Bauxites of Distomon S.A. (underground mines).	do		
	Delphi Bauxites S.A. (open cast mines).	do		
Chromium, run-of-mine.	Financial-Mining Industrial and Shipping Corp. (FIMISCO) (Scalistiris Group).	Tsagali mines near Volos, east-central Greece.	30	35
	Hellenic Ferroalloy S.A. (Government-owned).	Skoumtsa mines at Xeralivados, east-central Greece.	55	65
Iron, FeS_2	Hellenic Chemical Products and Fertilizers Co. (Bodossakis Group).	Kassandra mines, northeast Chalkidiki.	150	100
Lead, PbS concentrate.	do	Kassandra mines, northeast Chalkidiki.	34	100
Nickel ore	Société Minière Metallurgique de Larymna (Larco) (Bodossakis Group; now 80% Government-owned).	Agios Ioannis mines near Larmymra.	500	17
		Mines at Euboea	2,500	75
Steel (raw)	Halyvourgiki Inc. (privately owned).	Steel plants at Eleusis	1,500	75
	Metallurgiki Halyps S.A.	Almyros works near Volos	300	15
	Halyvourgia Thessalias S.A.	Steel plant near Volos	200	10
Zinc	Hellenic Chemical Products and Fertilizers Co. (Bodossakis Group).	Kassandra mines, northeast Chalkidiki.	47	100

During the year, Larco, together with other European nickel producers, lodged a complaint with the EEC alleging dumping of cut and uncut cathodes on the European market by the U.S.S.R. The allegation stressed that during the first 9 months of the year the Soviet share of the market increased from 9% to 18.5% and that this resulted in an EEC-wide reduction of output by 34%, a 16% drop in capacity utilization and a loss of 1,440 jobs.

NONMETALS

Asbestos.—Depressed markets and technical difficulties affected considerably the 1982 production schedule at the new 100,000-ton-per-year asbestos mining and processing complex at Zidani. Production for the year amounted to less than 25% of the complex's rated capacity, and operations were conducted on a 5-day instead of a 6-day work basis as planned. The complex was 91% Government-owned and operated by ETVA; 9% was owned by International Finance Corp. When operating at full capacity, about 20% of the output would be consumed domestically and about 80% would be earmarked for export.

Magnesite.—A major event in the magnesite industry was a complaint filed with the EEC by the Financial-Mining Industrial and Shipping Corp. (FIMISCO) and Macedonian Magnesite, magnesite-producing subsidiaries of the Scalistiris Group, on behalf of all EEC magnesite producers concerning alleged dumping practices by China and the Republic of Korea. The complaint alleged that the EEC market share for these countries increased from 21% to 44% and that prices were from 13% to 28% below those of the European producers. Over the same period (1979-80), there was a 40% reduction in the number of employees in this industry.

MINERAL FUELS

Lignite.—The main development in the lignite industry was in the field of policy rather than mining. A 10-year program of the Public Electricity Enterprises was established to use 80% lignite for the production of electric power by 1991. Also, during the year the construction of a coal terminal, which would facilitate imports, was examined.

Petroleum and Natural Gas.—New deposits of petroleum and gas were discovered near Katakolon; however, the offshore find was at too great a depth and too small to be commercially viable under present conditions. Production of both fuels increased during the year, but petroleum's share in electric power production dropped from 37% in 1981 to 26% in 1982.

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[1]Foreign mineral specialist, Division of Foreign Data.

[2]Where necessary, values have been converted from Greek drachmas (Dr) to U.S. dollars at the rate of Dr66.8=US$1.00.

The Mineral Industry of Guinea

By Suzann C. Ambrosio[1]

Guinea was the second largest producer of bauxite during 1982 and ranked first in the world in terms of bauxite reserves. Bauxite resources were estimated at nearly 6 billion tons and comprised just over 25% of the world's resources. Guinea's mining sector output, comprised of bauxite, alumina, and diamonds, was valued at approximately $462 million.[2] The gross national product (GNP) was estimated at $1.5 billion during 1981 and was projected to increase slightly during 1982. The mining sector's contribution to the GNP decreased slightly between 1981 and 1982, owing largely to depressed world markets and decreased output of all minerals and mineral products. Guinea exported nearly all mineral production.

Guinea's largely state-run economy has increasingly encouraged the private sector. A foreign investment code enacted in 1981 emphasized mining and other industrial enterprises as priority investments. The code offered potential investors relief from custom duties, import and export taxes, and tailored land use and mineral rights to the needs of a particular investment.

Guinea's one major Atlantic Ocean Port, Conakry, which supports total annual traffic volumes of approximately 3 million tons, was affected by congestion, poor infrastructure, and equipment problems. The Government was negotiating a $13 million loan from the International Bank for Reconstruction and Development (World Bank), a $14 million loan from the African Development Bank, and a variety of bilateral aid grants for the rehabilitation and improvement of port facilities.

PRODUCTION AND TRADE

Production of bauxite and alumina have declined slightly over the past 3 years. During 1982, approximately 9.7 million tons of dry basis ore, 98,000 tons of abrasive-quality calcined bauxite, and 549,000 tons of alumina were produced and exported. Bauxite exports to the Soviet Union have been and are expected to remain nearly constant over the years, as the Office des Bauxite de Kindia (OBK) settles arrears on a long-term debt agreement. OBK, one of Guinea's three largest bauxite producers, agreed to export bauxite to the Soviet Union in exchange for financial and technical assistance. Guinea imports all of its crude petroleum and petroleum product needs from the United States, Brazil, and the Soviet Union. Refinery product imports were reported at approximately 3 million barrels.

Table 1.—Guinea: Production of mineral commodities[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Aluminum:					
Bauxite:					
Mine production:					
Wet basis	11,648	14,653	13,427	12,833	11,479
Dry basis[3]	10,600	13,334	12,219	11,678	10,446
Shipments (dry basis):					
Metallurgical-grade bauxite	10,456	10,055	10,330	9,792	9,701
Calcined bauxite	--	--	111	98	98
Alumina:					
Production	622	662	708	679	578
Shipments	610	662	708	608	549
Diamond:					
Gem[e] thousand carats	25	27	12	12	10
Industrial[e] do	55	58	26	26	23
Total do	[e]80	[e]85	38	38	33

[e]Estimated. [p]Preliminary.

[1]Includes data available through July 15, 1983.

[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, stone, sand and gravel) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[3]Calculated, assuming 9% average moisture.

Table 2.—Guinea: Apparent exports of bauxite and alumina, by country[1]

(Metric tons)

Country	Bauxite		Alumina	
	1980	1981	1980	1981
Austria	15,236	22,099	--	--
Cameroon	--	NA	86,445	NA
Canada	1,505,869	661,246	--	--
France	979,822	1,544,177	--	--
Germany, Federal Republic of	1,463,858	1,379,144	26,040	48,236
Iceland	--	--	--	23,570
Italy	403,728	365,824	25,660	--
Poland	24,907	--	--	--
Spain	187,966	722,116	273,078	77,914
Sweden	--	--	--	23,020
U.S.S.R.[2]	[e]2,500,000	2,250,000	--	--
United Kingdom	2,551	19,597	--	--
United States	2,836,858	3,545,681	--	--
Yugoslavia	129,141	323,146	--	57,429
Total	10,049,936	10,833,030	411,223	230,169

[e]Estimated. NA Not available.

[1]Owing to a lack of official trade data published by the Government of Guinea, this table should not be taken as a complete presentation of Guinea's exports of bauxite and alumina. These data were gathered from various sources that include United Nations information and official trade data published by the partner trading countries. Table includes data available through July 15, 1983.

[2]Metal Statistics 1971-81, Metallgesellschaft Aktiengesellschaft, 1982, Frankfurt am Main, Federal Republic of Germany.

COMMODITY REVIEW

METALS

Bauxite and Alumina.—The nation's three open pit mines continued to be owned and operated through Government and private sector joint ventures, including the Compagnie des Bauxites de Guinée (CBG), OBK, and the Société d'Economie Mixte Friguia. Billiton Aluminum BV (Netherlands) was negotiating an equity participation deal with CBG minority shareholder Martin Marietta Corp. to assure delivery of roughly 6% of the Boke Mine's output.

Plans continued to be made to develop another open pit mine and refinery at Aye Koye. Alugui, the joint-venture company (participants unknown) planned the $300 million project to produce 9 million tons of bauxite, 1.2 million tons of alumina, and possibly 150,000 tons of aluminum metal annually. The company was concerned with securing power supplies prior to revealing more detailed plans and equity arrangements.

The Government of Guinea was also considering developing a bauxite and alumina open pit and refinery complex at Dabola. Discussions were taking place between the Government, Reynolds Metals Co., and unnamed Yugoslav, Algerian, and Nigerian companies.

Iron Ore.—Plans continued to be made to develop the Mifergui-Nimba iron ore deposit located in southern Guinea. The planned 15-million-ton-per-year open pit mine and concentrator facilities were estimated to cost approximately $1.1 billion. The project cost included a United States Steel Corp. engineering management contract for both the mining and pellet projects and a transport link to Liberian port facilities. A group of international aid organizations and Canadian and European investment institutions were expected to finance the project.

NONMETALS

Diamond.—Diamonds have been produced on a relatively small scale since 1930. Although the Government halted diamond mining operations in 1975 because of speculation and smuggling, two newly formed companies, both 50% state-owned, have renewed hopes for commercial exploitation. Total diamond reserves in the principal diamond deposit areas, a triangle between Kissidougou, Beyla, and Kerouane in south-central Guinea, were estimated at 30 million carats.

The Association pour la Récherche et l'Exploitation du Diamont et de l'Or (AREDOR), originally formed in 1978, was reorganized in 1981 to include Bridge Oil Ltd. of Australia and was called Aredor Guinea Inc. The other less active company, called the Société de Diamant de Guinee, was formed during 1980. The new joint venture, Aredor Guinea, was capitalized at $20 million equally between the Guinean Government and Aredor Holdings Ltd. (Australia). Aredor Holdings' capital was divided among Bridge Oil, 79.2%; Société Financiere Internationale (SFI), 11.3%; Industrial Co. Ltd. (United Kingdom), 5%; Simonius Vischer and Co. (Switzerland), 1%; and the remaining 3.5% shares were expected to be sold.

A strip diamond mine was planned with facilities capable of annually processing approximately 400,000 cubic meters of diamond-bearing gravel. The expected annual production of roughly 175,000 carats of gem-quality diamonds was projected to commence during 1984. At this production rate, reserves were estimated to last approximately 15 years. Mine development costs were estimated at nearly $85 million, not including $30 million already invested.

Guinea became a member of the World Bank group's International Finance Corp. (IFC) during September 1982 and applied for assistance to develop AREDOR. The IFC agreed to a $15.3 million package, including a $13.9 million loan to AREDOR and a $1.4 million AREDOR share subscription. Commercially syndicated loans of approximately $62.5 million were secured through the Bankers Trust Group, 69%, and Bayerische Vereinsbank and other West German industrial supplier institutions, 31%. The Bankers Trust Group was comprised of Continental Illinois National Bank and Trust Co., Chicago, Ill., $13 million; Bankers Trust New York Corp., $10 million; Manufacturers Hanover Trust Co., $10 million; BT Australia (HK) Ltd., $5 million; and Pittsburg National Bank, $5 million. The Overseas Private Investment Corp. agreed to provide approximately $43 million in political-risk insurance for U.S. investors for the approximate 6-year loan contract period. Hermes Versand Service GmbH & Co. (Federal Republic of Germany) was expected to cover the remaining political-risk capital excluding SFI's share.

MINERAL FUELS

Petroleum.—An information meeting was held on December 6 and 7, 1982, in Geneva, for companies interested in obtaining exploration permits. The Guinean Government contracted Petroconsultants S.A. (Switzerland) to organize and conduct the meetings. World Bank officials were present at the meeting and were expected to follow up with a visit to Guinea during 1983 to further discuss hydrocarbon and possibly other mineral exploration projects.

Uranium.—An international consortium for uranium exploration and exploitation in southeastern Guinea was formed at yearend 1982. The Government of Guinea held a 50% share in the project and other interests were divided among Nigerian, Moroccan, Yugoslav, and British companies. Contracts were signed between the Government and the Davy McKee Corp. for the latter to be responsible for technical and financial management as project operator. In addition, a drilling contract was signed with the Yugoslav firm Energoprojek.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Guinean syli (GS) to U.S. dollars at the rate of GS22.185=US$1.00 for 1982.

The Mineral Industry of Hungary

By Walter G. Steblez[1]

In 1982, Hungary's centrally planned economy, for the second straight year showed stability and displayed modest growth. National income increased by about 1.5% to 2.0%; industrial production registered a 2% increase over that of 1981. Within the latter category, mining and metallurgical industries increased output by 1.4% and 8%, respectively. Raw material and energy supplies were generally viewed as adequate with some shortages occurring in the second half of 1982; these were mainly supplied from hard-currency market economies and caused only minor production bottlenecks. The decline of the mining sector's labor force stabilized, whereas in other industrial sectors, for example, construction, Hungary reported labor force reductions.

Compared with 1981, total industrial employment declined by about 20,800 workers or 2% in 1982. At the same time, however, industrial labor productivity rose by 4.1% over that of 1981. In certain mining sectors the rise in labor productivity was attributed to increased overtime, amounting to an average 18 days per miner. The increase in productivity in this sector resulted in a wage bill increase amounting to 110 million forints.[2]

Government Policies and Programs.—The planned economic objectives, including mining, for the most part were met and in certain cases exceeded the plan. The trend of modest planned growth was expected to continue in 1983; national income and gross industrial output were to rise by 0.5% to 1.0% and 1.0% to 2.0%, respectively. Significant gains in coal mining in 1982 reportedly will permit total energy consumption to rise by 1% in 1983; also, nuclear energy would account for 4% to 5% of the produced electricity.

Streamlining industrial production and increasing product marketability remained chief goals for the 1980's. The profitable operation of decentralized industries and the reduction or elimination of subsidies were to competitively orient Hungarian industry with the economies of the Western World. This would include, to some degree, the transformation of the forint to a convertible currency.

Hungary's mineral industry policy stressed improved efficiency in both mining and processing. Domestic minerals, however, were not to be developed at all costs; mining investment and operations were to be commercially competitive on the world market with higher vertical product integration and correspondingly higher earning for the economy.[3]

PRODUCTION

Despite a depressed world market environment, Hungary's planned economy was able to produce more coal, natural gas, petroleum, and steel than in 1981; there was, however, a decline in the production of some of the country's traditional products of nonferrous metals.

Hungary continued to produce substantial quantities of bauxite and alumina as well as metallurgical-grade manganese ore. Hungary's continued linkage of industrial production-to-export capability to the world market had, to an extent, a dampening effect on bauxite mine production and metallurgy because of a drop in demand for aluminum and other metallurgical goods.

To save raw materials and increase product competitiveness raw material input weights were to be further reduced. In certain metallurgical products, Hungarian studies have shown up to 20% greater input of primary materials than comparable products in the Western World.

Table 1.—Hungary: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite, gross weight ----- thousand tons	2,899	2,976	2,950	2,914	[3]2,627
Alumina, gross weight ----------do----	782	788	805	792	[3]745
Metal, primary ----------	71,359	71,879	73,498	74,253	[3]74,220
Copper:					
Mine output, metal content[e] ----------	500	100	--	--	--
Metal:					
Smelter, secondary[e] ----------	300	100	100	100	100
Refined including secondary[e] ----------	13,100	12,000	12,000	12,000	12,000
Gold, mine output, metal content[e] thousand troy ounces	60	60	60	60	50
Iron and steel:					
Iron ore:					
Gross weight ---------- thousand tons	534	532	426	422	[3]467
Iron content ----------do----	120	121	90	88	[3]101
Metal:					
Pig iron:					
For steel industry ----------do----	2,252	2,262	2,094	2,065	[3]2,060
For foundry use ----------do----	78	107	120	128	[3]127
Total ----------do----	2,330	2,369	2,214	2,193	[3]2,187
Ferroalloys:					
Ferrosilicon ----------	[e]7,600	7,726	10,390	[e]10,500	10,500
Other[e] ----------	2,300	4,300	2,400	2,500	2,500
Total ----------	9,900	12,026	12,790	13,000	13,000
Crude steel ---------- thousand tons	3,877	3,908	3,764	3,645	[3]3,703
Semimanufactures, rolled only --do----	3,188	3,240	3,043	3,100	[3]2,856
Lead:					
Mine output, metal content[e] ----------	1,100	1,000	1,100	1,000	1,000
Metal, refined, secondary[e] ----------	100	100	100	100	100
Manganese ore:					
Run of mine[4] ----------	156,181	130,871	134,472	121,965	[3]150,035
Concentrate ----------	114,000	83,000	83,000	71,000	[3]92,606
Silver, mine output, metal content[e] thousand troy ounces	32	32	33	33	30
Zinc:					
Mine output, metal content[e] ----------	2,800	2,600	2,800	2,000	2,000
Metal, smelter, secondary[e] ----------	600	600	600	600	600
NONMETALS					
Cement, hydraulic ---------- thousand tons	4,764	4,857	4,660	4,635	[3]4,369
Clays:					
Bentonite:					
Raw ----------	82,211	72,488	77,685	80,531	[3]84,934
Processed ----------	56,076	48,140	51,061	52,515	[3]54,014
Kaolin:					
Raw ----------	68,199	63,457	51,839	52,518	[3]45,131
Processed ----------	6,859	7,300	7,067	7,024	[3]7,109
Lime, calcined ---------- thousand tons	740	[r]714	698	757	[3]835
Nitrogen: N content of ammonia ------do----	746	803	795	818	[3]776
Perlite ----------	92,630	97,895	99,270	95,190	[3]89,975
Pyrites, gross weight[e] ----------	7,000	7,000	7,000	7,000	7,000
Refractory materials, n.e.s.:					
Chamotte products ------ thousand tons	163	164	164	164	164
Chrome magnesite products -------do----	42	46	41	40	40
Sand and gravel:					
Gravel ---------thousand cubic meters	13,821	13,254	11,634	[e]11,500	11,500
Sand:					
Common ----------do----	279	415	406	400	400
Foundry ---------- thousand tons	787	818	496	692	[3]585
Sodium sulfate[e] ----------	11,000	11,000	11,000	11,000	11,000

See footnotes at end of table.

Table 1.—Hungary: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Stone:					
Dimension, all types thousand tons	2	2	1	1	1
Dolomite do	1,171	1,304	1,200	1,200	--
Limestone do	8,598	8,563	8,415	[e]8,500	8,500
Quartzite do	31	31	43	45	45
Sulfur:					
From pyrite[e]	3,000	3,000	3,000	3,000	3,000
Byproduct, elemental, all sources	8,633	9,412	9,293	[e]9,200	9,200
Total	11,633	12,412	12,293	[e]12,200	12,200
Sulfuric acid	643,795	587,948	589,838	573,240	575,000
Talc[e]	17,500	17,500	17,500	17,500	17,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	5,000	5,000	5,000	5,000	5,000
Coal:					
Bituminous thousand tons	2,954	3,002	3,056	3,066	[3]3,039
Brown do	14,302	14,182	14,157	14,463	[3]14,754
Lignite do	8,414	8,475	8,479	8,413	[3]8,286
Total do	25,670	25,659	25,692	25,942	[3]26,079
Coke:					
Coke oven:					
Metallurgical do	604	651	673	645	[3]618
Other[e] do	170	170	170	170	170
Total do	774	821	843	815	788
Gashouse[e] do	185	180	180	180	180
Total coke do	959	1,001	1,023	995	968
Fuel briquets do	1,169	1,251	1,250	1,338	[3]1,472
Gas:					
Manufactured million cubic feet	19,811	18,152	19,317	[e]18,000	18,000
Natural, marketed do	259,420	230,286	216,902	212,276	[3]240,140
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	2,380	3,834	3,791	[e]3,700	3,700
Liquefied petroleum gas do	2,912	3,480	[e]3,600	[e]3,500	3,500
Peat, agricultural use[e] thousand tons	70	70	70	70	70
Petroleum and refinery products:					
Crude:					
As reported do	2,198	[r]2,027	2,031	2,024	[3]2,027
Converted thousand 42-gallon barrels	[r]14,902	[r]13,743	13,770	13,723	13,743
Refinery products:[5]					
Gasoline including naphtha do	11,475	13,005	12,240	[e]12,000	12,000
Kerosine and other light distillates[6] do	6,285	5,968	6,960	[e]7,000	7,000
Distillate fuel oil do	26,968	29,571	27,207	26,297	[3]25,163
Residual fuel oil do	24,549	26,440	21,758	20,526	[3]17,329
Lubricants do	1,121	1,134	1,090	1,000	1,000
Other:					
Liquefied petroleum gas do	1,218	1,160	[e]1,100	[e]1,000	1,000
Asphalt and bitumen do	4,145	3,951	3,927	[e]3,900	3,900
Paraffin and petrolatum do	208	220	251	[e]250	250
Total do	75,969	81,449	74,533	71,973	67,642

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Sept. 2, 1983.

[2]In addition to the commodities listed, diatomite, gypsum, and a variety of other crude construction materials such as common clays are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]18% to 20% Mn.

[5]Excludes refinery fuel and losses.

[6]Data derived by subtracting reported motor gasoline and white spirit data from reported light refinery products total.

TRADE

Hungary's 1982 foreign trade plan was successfully implemented. The trade volume with centrally planned economy countries increased by 3% with exports rising 4%. Imports of mineral raw materials and fuels, especially from the U.S.S.R., declined noticeably in comparison with those of 1981. Overall imports from hard-currency market economy countries fell and exports to these countries rose in 1982. Together with most other centrally planned economy countries, Hungarian imports of raw materials dropped in comparison with those of 1981.

In midyear Hungary formally joined the International Bank for Reconstruction and Development (World Bank) and International Monetary Fund. It was expected that membership in these organizations would assist in capitalizing Hungarian participation in projects, including mineral projects, sponsored by the World Bank.

The U.S.S.R. remained Hungary's major supplier of industrial mineral and raw materials, including mineral fuels, iron ore, ferroalloys, and asbestos. Late in 1982, Metalimpex of Hungary signed an agreement with the U.S.S.R. to import 98 million rubles[4] worth of nonferrous metal in 1983. Also, agreements were concluded with a number of Latin American countries for Hungarian imports of ferrous and nonferrous metals and ores.

Table 2.—Hungary: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate[2]	541,943	498,322	--	Czechoslovakia 327,884; East Germany 140,353.
Oxides and hydroxides[2]	693,838	633,334	--	U.S.S.R. 354,495; Austria 148,614; Poland 78,753.
Ash and residue containing aluminum	NA	698	--	All to West Germany.
Metal including alloys:[2]				
Scrap	9,372	8,709	--	Austria 3,134; Italy 3,026; West Germany 1,972.
Unwrought	85,886	87,061	--	East Germany 19,650; Bulgaria 10,170; Poland 8,844.
Semimanufactures	28,861	31,230	236	East Germany 8,214; Cuba 4,231; Sweden 3,179.
Chromium:				
Ore and concentrate	--	2,552	--	All to Italy.
Oxides and hydroxides	105	72	--	Yugoslavia 40; Italy 27.
Copper:				
Sulfate	414	593	--	West Germany 583.
Ash and residue containing copper	NA	71	--	All to West Germany.
Metal including alloys:				
Scrap	5,195	6,678	--	Austria 4,377; West Germany 2,062.
Unwrought	3,857	4,556	--	West Germany 4,327; France 222.
Semimanufactures	3,566	3,417	35	West Germany 1,902; Austria 1,435; Italy 90.
Gallium: Metal including alloys, all forms kilograms	NA	400	--	All to West Germany.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	4,083	--	Do.
Iron and steel:				
Metal:				
Scrap	[3]31,000	[3]32,000	--	Italy 22,628; Austria 8,972.
Pig iron, cast iron, related materials	[2]2,149	6	--	All to Austria.
Ferroalloys:				
Ferrochromium	NA	20	--	All to Netherlands.
Ferrosilicon	NA	26	--	All to Austria.
Unspecified	[3]2,000	401	--	Italy 240; United Kingdom 136.

See footnotes at end of table.

Table 2.—Hungary: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Steel, primary forms[2]	13,119	9,990	292	West Germany 9,433.
Semimanufactures:				
Bars, rods, angels, shapes, sections[2]	714,070	713,322	--	West Germany 143,735; Syria 97,206; U.S.S.R. 96,076.
Universals, plates, sheets[2]	311,345	213,160	174	India 35,828; Austria 34,799; Syria 15,263.
Hoop and strip[2]	15,608	14,862	--	Romania 4,771; Yugoslavia 2,604; India 2,079.
Rails and accessories	327	111	--	West Germany 101.
Wire[2]	19,204	15,907	--	Iran 6,898; Algeria 1,820; Yugoslavia 1,294.
Tubes, pipes, fittings[2]	67,622	86,818	52	Algeria 14,807; West Germany 13,904; Iran 13,542.
Castings and forgings, rough[2]	20,088	19,178	--	West Germany 6,622; India 3,443; Iran 3,416.
Unspecified[2]	36,787	37,069	--	U.S.S.R. 20,258; West Germany 5,459; Kuwait 2,917.
Lead:				
Ash and residue containing lead	NA	1,233	--	West Germany 753; Italy 480.
Metal including alloys:				
Scrap	7,974	2,391	--	West Germany 1,279; Italy 591; Austria 521.
Unwrought	--	498	--	All to Austria.
Semimanufactures	75	NA		
Manganese: Ore and concentrate, metallurgical-grade[2]	37,745	221,066	--	U.S.S.R. 148,165; Czechoslovakia 72,856.
Metalloids: Unspecified	3	(4)	--	Mainly to Belgium-Luxembourg.
Molybdenum: Metal including alloys, all forms kilograms	715	25	--	All to Morocco.
Nickel:				
Matte and speiss	21	NA		
Metal including alloys:				
Scrap	474	172	--	West Germany 164.
Unwrought	261	561	--	Finland 254; Austria 167; West Germany 140.
Semimanufactures	158	232	--	Yugoslavia 95; Sweden 72; West Germany 46.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$2,063	$395	--	West Germany $252; Italy $142.
Silver:				
Waste and sweepings[5] do	$6,365	$5,906	--	West Germany $5,805; Austria $101.
Metal including alloys, unwrought and partly wrought do	$1,578	$1,600	--	West Germany $792; Austria $311; France $243.
Tin: Metal including alloys:				
Scrap	18	NA		
Semimanufactures kilograms	--	360	--	All to Morocco.
Tungsten: Metal including alloys, all forms	1	1	--	All to Singapore.
Zinc:				
Matte	NA	597	--	All to West Germany.
Ash and residue containing zinc	NA	2,259	--	Do.
Metal including alloys:				
Scrap	738	1,012	--	West Germany 785; Austria 227.
Unwrought	--	22	--	All to Austria.
Semimanufactures	--	20	--	All to Switzerland.
Other:				
Ores and concentrates	--	4	--	All to West Germany.
Oxides and hydroxides	17	4	4	
Ashes and residues	22,671	9,716	--	Austria 9,547; Denmark 57; West Germany 42.
Cermets	NA	5	--	All to West Germany.
Base metals including alloys, all forms	196	32	--	Belgium-Luxembourg 12; West Germany 7; United Kingdom 6.

See footnotes at end of table.

Table 2.—Hungary: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	162	--	All to West Germany.
Artificial: Corundum	[2]9,173	7,461	--	West Germany 6,608; Italy 582.
Grinding and polishing wheels and stones[2] value, thousands	$2,110	$2,170	$19	Romania $966; East Germany $599; Poland $149.
Asbestos, crude	5,285	2,529	--	All to Belgium-Luxembourg.
Boron materials:				
Cement[2]	186,400	185,448	--	Yugoslavia 132,269; Poland 20,385; U.S.S.R. 19,400.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	177	64	--	All to Austria.
Bentonite[2]	15,604	18,218	--	East Germany 11,409; Poland 4,991; Czechoslovakia 1,738.
Chamotte earth	485	472	--	All to Austria.
Kaolin[2]	6,496	6,615	--	Czechoslovakia 4,963; West Germany 1,652.
Unspecified	158	383	--	Austria 186; West Germany 174.
Products:				
Nonrefractory	4,461	4,929	--	West Germany 2,930; Austria 1,408; Egypt 275.
Refractory including nonclay brick[2]	24,757	17,034	--	Romania 5,180; Italy 3,957; Albania 3,167.
Diamond:				
Gem, not set or strung value, thousands	$76	$52	--	All to Belgium-Luxembourg.
Industrial do	$1,018	$1,959	--	Do.
Diatomite and other infusorial earth	3,832	3,125	--	Austria 2,675; Greece 213; West Germany 187.
Feldspar, fluorspar, related materials:				
Unspecified	2,491	2,705	--	All to Switzerland.
Fertilizer materials:				
Crude, n.e.s	--	20	--	All to West Germany.
Manufactured:				
Ammonia[2]	86,500	70,243	--	Yugoslavia 60,909; Czechoslovakia 4,952.
Nitrogenous thousand tons	[2]961	[2]1,306	--	Yugoslavia 168; West Germany 116; Pakistan 21.
Phosphatic[6]	52,222	116,667	--	NA.
Potassic	--	24	--	All to Austria.
Unspecified and mixed	97,998	71,315	--	West Germany 61,107; Yugoslavia 7,326.
Lime	20	NA		
Mica:				
Crude including splittings and waste	--	2	--	France 1; Italy 1.
Worked including agglomerated splittings value, thousands	$5	$8	--	Yugoslavia $6; France $2.
Pigments, mineral: Iron oxides and hydroxides, processed	65	NA		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$2	$21	--	Italy $19.
Synthetic do	$6	NA		
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	6	NA		
Sodium hydroxide	3,000	576	--	All to Austria.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[2]	52,521	34,212	--	U.S.S.R. 15,510; Yugoslavia 10,926; East Germany 2,734.
Worked	1,227	388	([4])	Austria 202; Switzerland 146.
Dolomite, chiefly refractory-grade	348	148	--	West Germany 88; Finland 60.
Gravel and crushed rock	43,739	33,107	--	Austria 21,691; Yugoslavia 11,416.
Limestone other than dimension	22,660	14,999	--	All to Yugoslavia.
Quartz and quartzite	9,386	17,468	--	All to Austria.
Sand:[2]				
Industrial	37,752	60,309	--	Austria 43,791; Yugoslavia 16,185.
Construction cubic meters	299,078	321,280	--	Czechoslovakia 291,041; Austria 9,827; U.S.S.R. 7,212.

See footnotes at end of table.

Table 2.—Hungary: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental: Crude including native and byproduct	1,449	3,046	--	Yugoslavia 1,563; Austria 1,483.
Sulfuric acid[2]	68,411	63,284	--	Austria 63,164.
Talc, steatite, soapstone, pyrophyllite	--	20	--	All to Belgium-Luxembourg.
Vermiculite	NA	19,384	--	All to West Germany.
Other:				
Crude[2]	104,487	106,017	--	East Germany 29,390; Austria 24,110; Poland 15,165.
Slag and dross, not metal-bearing	46,980	969	--	Austria 873; Yugoslavia 96.
Building materals of asphalt, asbestos and fiber cements, unfired nonmetals	NA	14,506	--	Switzerland 5,174; Italy 3,505; Austria 1,946.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	198	319	--	All to Austria.
Coal:				
Anthracite and bituminous[6]	267,000	187,000	--	NA.
Briquets of anthracite and bituminous coal	40	11,215	--	All to Austria.
Lignite including briquets[2]	44,547	42,422	--	Austria 23,164; U.S.S.R. 18,058.
Coke and semicoke	596	NA		
Gas natural ---- million cubic feet	311	408	--	U.S.S.R. 339; Czechoslovakia 69.
Hydrogen, helium, rare gases ---- do	--	3	--	All to Austria.
Peat including briquets and litter[2]	6,340	12,761	--	Austria 7,029; Yugoslavia 3,283; West Germany 1,834.
Petroleum and refinery products:				
Crude[6] thousand 42-gallon barrels	6,000	3,621	--	NA.
Refinery products:				
Liquefied petroleum gas[2] do	840	722	--	Yugoslavia 440; Netherlands 107; Austria 62.
Gasoline do	[2]341	[2]1,094	--	West Germany 266; Switzerland 226.
Mineral jelly and wax[2] do	240	247	--	West Germany 83; Italy 54; Sweden 23.
Kerosine and jet fuel[2] do	408	386	(4)	U.S.S.R. 237; East Germany 20; United Kingdom 20.
Distillate fuel oil[2] do	702	1,482	--	Austria 482; West Germany 462; U.S.S.R. 211.
Lubricants[2] do	305	289	--	Austria 175; Yugoslavia 52; West Germany 28.
Residual fuel oil[2] do	2,738	1,947	--	Austria 1,056; Czechoslovakia 689.
Bitumen and other residues[2] do	604	558	--	Austria 156; United Arab Emirates 143; Libya 81.
Bituminous mixtures do	2	--		
Tars and other crude chemicals derived from coal, gas, and petroleum[2]	150,728	176,671	--	Romania 73,967; Italy 43,844; West Germany 27,713.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Hungary, this table should not be taken as a complete presentation of this country's mineral trade. These data were compiled from various sources, which include United Nations information, data published by the partner trade countries, and partial official trade sources of Hungary.

[2]Official Trade Statistics of Hungary.

[3]Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[4]Less than 1/2 unit.

[5]May include other precious metals.

[6]Statistical Yearbook of Members of Council for Mutual Economic Assistance, Moscow, U.S.S.R.

Table 3.—Hungary: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	283	27	--	West Germany 24; Austria 3.
Aluminum:				
Ore and concentrate	156	3	--	Netherlands 2; Switzerland 1.
Oxides and hydroxides	123	265	151	West Germany 102; United Kingdom 11.
Metal including alloys:				
Scrap	--	16	--	All from West Germany.
Unwrought[2]	187,865	154,499	--	U.S.S.R. 151,334; Poland 1,600; Romania 1,260.
Semimanufactures[2]	7,923	5,759	1	East Germany 3,562; Czechoslovakia 1,022; Switzerland 226.
Beryllium: Metal including alloys, all forms	--	5	--	West Germany 4.
Cadmium: Metal including alloys, all forms	12	4	--	All from Yugoslavia.
Chromium:				
Ore and concentrate	19,242	711	--	All from Finland.
Oxides and hydroxides	--	51	--	Italy 50.
Metal including alloys, all forms kilograms	--	3	3	
Cobalt:				
Oxides and hydroxides	5	29	--	France 22; Netherlands 7.
Metal including alloys, all forms	--	28	--	France 27.
Columbium and tantalum: Metals including alloys, all forms: Tantalum	36	(3)	--	All from West Germany.
Copper:				
Sulfate[2]	4,216	3,661	--	All from U.S.S.R.
Metal including alloys:				
Scrap	3,090	2,816	--	Switzerland 1,546; West Germany 694; Belgium-Luxembourg 383.
Unwrought	[2]28,962	[2]61,406	--	West Germany 5,281; Austria 3,170; undetermined 51,916.
Semimanufactures	[2]8,393	[2]35,799	3	West Germany 1,091; Austria 254; undetermined 33,568.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	903	--	West Germany 678; Switzerland 225.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite[2] thousand tons	3,286	3,765	--	U.S.S.R. 3,392; Sweden 194; Yugoslavia 90.
Pyrite, roasted[2]	320,799	203,865	--	U.S.S.R. 106,162; Romania 69,902; Yugoslavia 16,215.
Metal:				
Scrap[4]	4,000	144,000	--	NA.
Pig iron, cast iron, related materials[2]	255,823	289,546	--	U.S.S.R. 272,168; Yugoslavia 16,038.
Ferroalloys:				
Ferrochromium[2]	7,662	6,547	--	U.S.S.R. 5,518; Yugoslavia 530; Bulgaria 400.
Ferromanganese[2]	62,023	44,431	--	U.S.S.R. 23,581; Norway 13,500; Czechoslovakia 6,700.
Ferromolybdenum	NA	60	--	All from Sweden.
Ferrosilicon[2]	6,556	6,863	--	U.S.S.R. 6,842.
Unspecified	11,215	15,725	200	U.S.S.R. 13,466; Czechoslovakia 497; France 405.
Steel, primary forms[2]	443,633	433,562	--	U.S.S.R. 412,505; Bulgaria 8,601; Yugoslavia 6,740.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	173,187	184,109	--	U.S.S.R. 146,484; Czechoslovakia 17,385; Austria 5,933.
Universals, plates, sheets[2]	340,562	356,708	--	U.S.S.R. 234,919; Czechoslovakia 28,248; East Germany 17,516.
Hoop and strip[2]	9,442	9,970	--	West Germany 2,843; Austria 2,429; Czechoslovakia 1,300.
Rails and accessories	[4]3,000	[4]3,000	--	West Germany 744.
Wire[2]	37,427	35,582	--	Czechoslovakia 15,876; West Germany 4,299; Austria 3,197.
Tubes, pipes, fittings[2]	69,131	89,827	10	West Germany 20,737; East Germany 20,422; Romania 18,612.
Castings and forgings, rough[2]	13,338	15,959	--	Yugoslavia 12,326; West Germany 1,160; Italy 1,153.
Unspecified[2]	1,773	1,087	--	France 1,048; Italy 26.

See footnotes at end of table.

Table 3.—Hungary: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides	2,911	1,817	--	France 1,031; Austria 678; West Germany 101.
Metal including alloys:				
Unwrought	[2]12,868	[2]11,033	--	Austria 151; Denmark 150; undetermined 10,731.
Semimanufactures	23	105	--	Belgium-Luxembourg 73; United Kingdom 31.
Magnesium: Metal including alloys:				
Unwrought	[5]41	569	105	Italy 382; Yugoslavia 82.
Semimanufactures	20	141	--	United Kingdom 93; Austria 18; West Germany 15.
Manganese:				
Ore and concentrate, metallurgical-grade[2]	15,537	150	150	
Oxides	80	--		
Metalloids:				
Silicon	NA	1,548	--	Norway 549; Yugoslavia 549; Italy 450.
Unspecified	9,358	11,304	--	France 11,253.
Molybdenum:				
Ore and concentrate	79	60	--	All from Sweden.
Metal including alloys, all forms	22	136	(3)	West Germany 134.
Nickel:				
Oxides and hydroxides	NA	9	--	All from Netherlands.
Metal including alloys:				
Scrap	134	NA		
Unwrought	4	5	--	All from West Germany.
Semimanufactures	124	77	--	Canada 25; Sweden 13; West Germany 12.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified, value, thousands	$8,084	$6,097	$253	West Germany $5,555; United Kingdom $287.
Silver:				
Waste and sweepings, do.	--	$2	--	All from West Germany.
Metal including alloys, unwrought and partly wrought, do.	$5,120	$4,415	--	United Kingdom $3,046; West Germany $1,278; Austria $53.
Tin: Metal including alloys:				
Unwrought	[2]1,621	[2]1,369	--	Belgium-Luxembourg 100; undetermined 1,269.
Semimanufactures	11	20	--	Netherlands 19.
Titanium:				
Ore and concentrate	1,687	1,120	--	Netherlands 950; West Germany 170.
Oxides	3,238	2,619	--	United Kingdom 1,058; Finland 785; Belgium-Luxembourg 490.
Metal including alloys, all forms	--	6	--	Belgium-Luxembourg 3; West Germany 3.
Tungsten:				
Ore and concentrate	6	NA		
Metal including alloys, all forms	16	11	(3)	West Germany 9; Netherlands 2.
Zinc:				
Oxides	3,087	2,759	--	Yugoslavia 1,045; Belgium-Luxembourg 889; Austria 625.
Metal including alloys:				
Unwrought	[2]24,319	[2]26,660	--	Poland 7,764; Yugoslavia 5,801; Finland 1,799.
Semimanufactures	[2]7,215	[2]6,927	--	Yugoslavia 1,010; West Germany 823; undetermined 5,091.
Zirconium: Ore and concentrate	NA	2,555	--	Italy 2,535.
Other:				
Ores and concentrates[2]	5,925	16,923	20	U.S.S.R. 15,386; Canada 1,123; China 150.
Oxides and hydroxides	1,078	2,229	33	Sweden 1,294; Austria 799; West Germany 74.
Ashes and residues	10	72	--	Denmark 60; United Kingdom 12.
Base metals including alloys, all forms	88	54	(3)	Austria 31; Belgium-Luxembourg 15; West Germany 7.

See footnotes at end of table.

Table 3.—Hungary: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	24	30	--	West Germany 19; Italy 11.
Artificial: Corundum[2]	4,343	2,346	186	Italy 1,086; West Germany 644; Switzerland 275.
Dust and powder of precious and semi-precious stones, including diamond value, thousands	$190	$163	$121	United Kingdom $32; Belgium-Luxembourg $10.
Grinding and polishing wheels and stones[2] do	$6,805	$9,027	$408	Austria $2,422; West Germany $1,812; U.S.S.R. $965.
Asbestos, crude[2]	48,402	33,999	--	U.S.S.R. 31,695; Botswana 1,899.
Barite and witherite	19,879	17,299	--	Yugoslavia 16,200; West Germany 1,099.
Boron materials:				
Crude natural borates	11,920	1,960	--	Netherlands 1,900; France 60.
Oxides and acids	3,634	3,695	--	France 2,195; U.S.S.R. 1,500.
Cement[2]	861,198	695,840	160	U.S.S.R. 501,211; Czechoslovakia 102,865; Romania 70,023.
Chalk	3,221	3,204	--	Austria 1,804; France 1,400.
Clays and clay products:				
Crude:				
Chamotte earth[2]	66,149	72,371	--	Czechoslovakia 65,873; France 2,498; Israel 1,550.
Dinas earth	NA	2,705	--	West Germany 2,310; Austria 395.
Fire clay	NA	22,279	--	Poland 14,034; West Germany 7,122.
Kaolin[2]	34,903	30,868	--	Austria 10,677; Czechoslovakia 9,949.
Unspecified[2]	78,220	58,545	--	Czechoslovakia 53,348.
Products:				
Nonrefractroy	3,904	6,845	--	Yugoslavia 4,462; Austria 1,245; Italy 912.
Refractory including nonclay brick[2]	48,925	64,285	29	Austria 32,980; West Germany 14,397; East Germany 5,222.
Diamond:				
Gem, not set or strung value, thousands	$469	$337	--	West Germany $211; Switzerland $126.
Industrial do	$2,127	$4,521	--	Belgium-Luxembourg $3,323; West Germany $977; United Kingdom $190.
Diatomite and other infusorial earth	828	2,218	--	Iceland 1,745; France 421; Austria 51.
Feldspar, fluorspar, related materials:				
Feldspar	NA	3,320	--	Yugoslavia 1,800; Norway 1,520.
Fluorspar	NA	3,180	--	All from West Germany.
Unspecified	14,042	639	--	Finland 400; Sweden 100; Italy 99.
Fertilizer materials:				
Crude, n.e.s	--	250	--	All from France.
Manufactured:				
Ammonia	5	39	--	West Germany 30; Belgium-Luxembourg 9.
Nitrogenous, N_2 content[2]	96,490	189,694	2,760	U.S.S.R. 162,087; Austria 20,414; Belgium-Luxembourg 3,680.
Phosphatic, P_2O_5 content[2]	129,337	136,041	32,238	Yugoslavia 31,976; U.S.S.R. 25,301; Tunisia 15,286.
Potassic, K_2O content[2]	528,894	558,602	--	U.S.S.R. 361,085; East Germany 190,737.
Unspecified and mixed[2]	96,972	102,273	--	Yugoslavia 58,564; U.S.S.R. 43,084.
Graphite, natural	80	604	5	Austria 500; West Germany 94.
Gypsum and plaster[2]	86,584	22,000	--	All from East Germany.
Halogens:[2]				
Bromine	618	713	--	Israel 309; East Germany 303.
Iodine	34	54	--	Japan 35; U.S.S.R. 19.
Lime[2]	103,219	168,647	--	East Germany 65,096; Yugoslavia 63,099; Romania 19,651.
Magnesium compounds:				
Magnesite[2]	118,258	91,396	--	Czechoslovakia 73,858; North Korea 7,671; U.S.S.R. 6,284.
Oxides and hydroxides	NA	221	--	France 137; West Germany 84.
Other	NA	12,248	--	Austria 12,194.
Mica:				
Crude including splittings and waste	330	163	--	United Kingdom 139; Norway 15.
Worked including agglomerated splittings	33	48	--	Switzerland 35; Austria 11.
Phosphates, crude[2]	671,784	674,150	--	U.S.S.R. 499,382; Morocco 89,827; Algeria 77,080.

See footnotes at end of table.

Table 3.—Hungary: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pigments, mineral: Iron oxides and hydroxides, processed	2,887	3,095	(3)	West Germany 2,685; France 200; Belgium-Luxembourg 122.
Potassium salts, crude[2]	2,312	2,719	--	U.S.S.R. 1,608; East Germany 798; Romania 170.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$59	$122	--	Switzerland $96; West Germany $21.
Synthetic do.	$219	$102	$8	Switzerland $70; Austria $13.
Pyrite, unroasted[2]	89,676	89,237	--	All from U.S.S.R.
Salt and brine[2]	820,520	768,006	--	Romania 497,557; U.S.S.R. 142,920; Poland 76,787.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides[2]	1,754	961	--	East Germany 736; France 225.
Sodium carbonate, natural and manufactured[2]	205,823	189,782	--	Bulgaria 112,207; Romania 62,762; Poland 9,357.
Sodium hydroxide[2]	74,702	24,037	--	Romania 17,485; West Germany 2,903; Italy 1,525.
Sodium sulfate, natural and manufactured	NA	1,875	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[2]	r9,287	5,214	--	Bulgaria 3,138.
Worked	--	661	--	Italy 541; Austria 89.
Dolomite, chiefly refractory-grade	--	13	--	All from West Germany.
Gravel and crushed rock	7,819	9,422	--	Austria 5,140; Yugoslavia 2,673; Italy 845.
Quartz and quartzite	1,830	2,191	--	West Germany 1,553; Netherlands 595.
Sand other than metal-bearing[2]	112,737	126,208	43	Czechoslovakia 97,316; East Germany 20,952.
Sulfur:				
Elemental:				
Crude including native and byproduct[2]	250,960	183,164	--	Poland 139,596; U.S.S.R. 43,506.
Colloidal, precipitated, sublimed	35	35	--	Italy 30; West Germany 5.
Dioxide	NA	262	--	All from West Germany.
Sulfuric acid[2]	8,733	11,837	--	U.S.S.R. 10,360; Poland 1,477.
Talc, steatite, soapstone, pyrophyllite	2,069	3,366	--	Austria 1,252; Finland 1,163; Italy 934.
Other:				
Crude[2]	63,257	59,709	--	Czechoslovakia 13,462; Bulgaria 12,119; Austria 8,022.
Slag and dross, not metal-bearing	17	164	--	All from Netherlands.
Oxides and hydroxides of barium, magnesium, strontium	505	169	--	Italy 100; France 63.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	1,686	48	Sweden 716; Belgium-Luxembourg 476; Austria 330.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	32	41	--	All from West Germany.
Carbon:[2]				
Carbon black	200	979	--	U.S.S.R. 699; East Germany 280.
Gas carbon	19,839	19,088	--	U.S.S.R. 18,586; West Germany 306; Italy 170.
Coal:[2]				
Anthracite and bituminous thousand tons	1,623	1,678	70	U.S.S.R. 662; Czechoslovakia 466; Poland 406.
Briquets of anthracite and bituminous coal	503,747	523,792	--	All from East Germany.
Lignite including briquets	--	4,147	--	All from U.S.S.R.
Coke and semicoke[2] thousand tons	1,492	1,156	--	U.S.S.R. 503; West Germany 173; Czechoslovakia 166.
Gas natural[2] million cubic feet	142,847	141,329	--	U.S.S.R. 134,196; Romania 7,063.
Hydrogen, helium, rare gases do.	(4)	9	--	All from Austria.
Petroleum and refinery products:				
Crude[2] thousand 42-gallon barrels	61,323	57,003	--	U.S.S.R. 53,508; Iran 3,495.
Refinery products:				
Liquefied petroleum gas do.	219	255	--	U.S.S.R. 245; West Germany 10.
Gasoline[2] do.	5,214	4,516	--	U.S.S.R. 4,432; Albania 36; Czechoslovakia 26.
Mineral jelly and wax do.	3	2	--	West Germany 1.

See footnotes at end of table.

Table 3.—Hungary: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Kerosine and jet fuel[2] thousand 42-gallon barrels	2,228	2,100	--	U.S.S.R. 1,831; East Germany 72; Poland 17.
Distillate fuel oil[2] do	6,777	5,348	--	U.S.S.R. 5,272; United Kingdom 74.
Lubricants[2] 42-gallon barrels	142,877	123,375	79	U.S.S.R. 79,009; Netherlands 14,917; Belgium-Luxembourg 5,754.
Nonlubricating oils do	24	1,057	--	All from West Germany.
Residual fuel oil[2] do	613,220	225,488	--	United Kingdom 125,581; U.S.S.R. 99,907.
Bitumen and other residues do	236	612	--	Austria 588.
Bituminous mixtures do	1,588	1,909	--	Sweden 927; Austria 703.
Petroleum coke do	84,623	78,233	--	Norway 77,809; West Germany 424.
Tars and other crude chemicals derived from coal, gas, and petroleum[2]	44,883	49,735	249	U.S.S.R. 12,133; Italy 6,126; West Germany 5,520.

[p]Preliminary. [r]Revised. NA Not available.

[1]Owing to a lack of official trade data published by Hungary, this table should not be taken as a complete presentation of this country's mineral trade. These data were compiled from various sources which include United Nations information, data published by the partner trade countries and partial official sources of Hungary.

[2]Official Trade Statistics of Hungary.

[3]Less than 1/2 unit.

[4]Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[5]Excludes exports from Norway valued at $148,000.

[6]Quantity in 1980 was 1 ton.

COMMODITY REVIEW

METALS

In 1982, Hungary remained a net importer of most metallic raw materials, except for bauxite and manganese ore. The depressed world market had a negative impact on Hungary's metallurgical industry during the year but the negative effects on other industrial sectors were less pronounced.

Aluminum and Bauxite.—Hungary's aluminum industry suffered serious losses because of stagnant world demand and a sharp drop in prices for aluminum products. Bauxite mine output declined by about 10% and hard-currency export earnings from the industry's sales dropped by 19% from that of 1981. At the same time, electric power consumption associated with dewatering underground workings has been steadily rising.

Table 4.—Dewatering in Hungarian bauxite mining operations

	1970	1975	1980	1981
Bauxite production 1,000 tons	2,020	2,889	2,950	2,914
Bauxite produced under water table percent	71	91	82	74
Bailed water million cubic meters	146.3	189.0	209.5	204.4
Expended energy million kilowatt hours	81.9	135.0	183.7	184.2

Source: Financial Times, Sept. 21, 1982, supplement.

Although revitalization of the industry was expected with improvement in future market conditions, in the meantime, reportedly about 1 million forints would be required to help shore up the bauxite mining. Salient developments in the bauxite mining area were the completion of construction of the Bito II bauxite mine, the expansion of the Halimba III Mine in the Bakony area by 440,000 tons of new capacity, and the construction startup of the Fenyofo Mine.

Important developments in the aluminum industry included the planned completion of the Szekesfehervar light metals works that would cost 7 billion forints and increase the capacity of the plant by 20%. During the year, a furnace explosion was reported at this plant, critically injuring a number of foundry workers and causing several million forints worth of damage.

At the Ajka alumina plant an experimental shop was reported under construction for the production of gallium using a Soviet technology that would make the use of mercury unnecessary and would improve the health conditions of the work force. The plant was to produce 150 kilograms of gallium per year for semiconductor manufacture. A 3,000-kilogram-per-year facility was planned for the future.

The 1983 plans for the industry, as a whole, called for a 3.5% increase in bauxite production and a 7.7% increase in alumina production compared with 1982, and a concurrent shift in exports from market economy countries to centrally planned economy countries.

Copper.—Although mine production of copper ended in 1980, the recently discovered Recsk copper deposit promised to satisfy Hungary's future consumption requirement for copper, as well as part of the country's lead and zinc demands. The deposit, 500 to 1,200 meters beneath the surface, was about 2 kilometers long by 900 meters wide. At 500 to 950 meters deep the deposit is largely porphyritic; at 750 to 1,200 meters deep the ore forms veins and lenses. In 1982, studies of the deposit reportedly continued. Further mine development was to be tied to improvement in world copper price trends.

Iron and Steel.—Hungary maintained some production of sideritic ore at the Rudabanya Mine. Imported ore, as in past years, came from the U.S.S.R.

Hungarian steel industry experts were studying the possibility of reducing imports of Soviet ore, which contained about 54% iron and 18% silica, and replacing it with the more costly but higher quality Swedish product containing 64% iron. The main impediment to this was financing, owing to a high $7.8 billion foreign debt and hard-currency reserves of only $1.85 billion at the end of 1981. Should credit become available, one option could be the construction of a $50 to $100 million rail link for ore freight from a Yugoslav port to Hungary.

Although pig iron and crude steel production remained at the levels of the preceding year, Hungary's steel industry suffered the adverse effects of the worldwide steel market crisis in 1982. Exports declined while production costs were increasing. Between 1979 and 1981, coke costs, for example, increased from 8 billion forints per year to 17 billion forints. Also, labor force shortages were reportedly severe enough to have required the engagement of 2,000 foreign workers.

Important developments in 1982 included the startup of the No. 2 oxygen converter at the Danube Iron and Steel Complex at Dunaujvaros. The project, built with Soviet assistance and costing 9.4 billion forints, was to add 750,000 tons of steel production capacity by 1983, bringing the total capacity of the converter shop to 1.15 million tons per year. Credits of 10.6 billion forints were also granted to the Danube Iron and Steel Complex for the construction of a coking plant; trial runs were scheduled to start in the first quarter of 1986 and the construction completion date was set for March 1987. At the Ozd metallurgical plant it was planned to renovate a blast furnace at a cost of 70 million forints.

In 1982, Hungary's steel exports to the U.S. market consisted largely of about $2 million worth of ball and roller bearings, and negotiations were reported to export flat-rolled steel as well. An important issue was the depressed U.S. steel market and whether subsidized steel products exported to the United States would not be subject to antidumping procedures under GATT rules.

Lead and Zinc.—The country continued to mine and smelt minimal amounts of lead and zinc and the deposits worked by the Gyongyosoroszi Mine were reportedly nearing depletion.

Manganese.—Hungary's only manganese mining operation at Urkut, in the northern Lake Balaton area, was to increase mine output owing to a growth in domestic demand from the Danube Iron and Steel Complex's new oxygen converter shop;

46,000 tons of ore was to be supplied to the converters and an additional 10,000 tons was to be exported during the year.

NONMETALS

Hungary's 12 mines in the Tokaj Mountains had been producing annually about 300,000 tons of nonmetallic industrial minerals such as perlite, zeolite, kaolin, and bentonite. In 1982, investment in the construction industry was substantially curtailed, which resulted in a decline in the demand for a number of these industrial nonmetallic minerals.

Cement.—Cement production dropped for the third straight year because of declines in investment and capital construction.

Perlite.—The perlite industry, located at Palhaza in the Tokaj region, was rated at 100,000 tons per year of which 55,000 were marked for export. The National Ore and Mineral Mine Enterprise, the producing agency, planned to increase output by 35% by 1985. Production capacity of expanded perlite was 500,000 cubic meters; it was produced at plants in Nyirtek, Japolca, and Paszto under the administration of the Konnyubeton es Szigeteloanyagipari Vallalat, a nationalized company.

MINERAL FUELS

Hungary's domestic consumption of energy rose by about 1% in 1982 owing to increased private consumer use, but industrial consumption of all energy carriers actually declined during the year. Domestic production as a share of consumption remained at about 48%. Greater emphasis was placed on domestic coal mining than in the past. Imports of petroleum from hard-currency sources were eliminated, and petroleum imports from the U.S.S.R. were reduced and replaced by increasing imports of natural gas.

Coal.—The Hungarian coal production plan was overfulfilled, with the output of over 26 million tons. The new coal mines, Markushegy and Nagyegyhaza, increased their combined production to 2 million tons of coal. Two new coal mines at Many and Lencsehegy were scheduled to come on-stream by 1985. The estimated total capacity of these four new "Eocene" coal mines would be 6,000,000 metric tons per year. During the year, imports of coking coal, largely from the Council for Mutual Economic Assistance countries, were significantly reduced.

Petroleum and Natural Gas.—Production of petroleum was maintained at the same level as that of 1981. Output of natural gas, however, was increased above the planned level for 1982, and construction of the Vorosfold-Kiskundorozsma section of the Soviet-Hungarian gas pipeline was completed.

Nuclear Power.—The Paks nuclear power station became fully operational during the year. It operated at 20% of capacity during the testing stage and at full capacity will reach 440 megawatts. By 1987, an addition of three more blocks was planned to bring the station's rating to 1,760 megawatts.

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[1]Foreign mineral specialist, Division of Foreign Data.

[2]The rate of Hungarian forints (Ft) to U.S. dollars was Ft34.98=US$1.00 (official rate, May 26, 1982). The conversion of Hungarian national income and foreign exchange accounts into U.S. dollars was not done owing to different criteria used in determining value in centrally planned economies as opposed to those used in market economies.

[3]Nepszabadsag. Sept. 11, 1982, p. 5.

[4]The relationship of the Soviet ruble, a nonconvertible currency, to the U.S. dollar was based upon the fluctuation of the dollar-ruble ratio. The rate of rubles to dollars was ruble0.73=US$1.00 (official rate, Dec. 31, 1982). See footnote 2 for soft currency conversion rationale.

The Mineral Industry of Iceland

By Joseph B. Huvos[1]

In 1982, Iceland's economy suffered a sharp downturn, the krona fell 90% against the U.S. dollar, inflation was 60%, and the gross national product (GNP) was $2.8 billion,[2] a loss of 3.5% in real terms, but unemployment was maintained at 0.3%. The poor year in Iceland's economy resulted in a foreign trade deficit equivalent to about 5% of the GNP.

The contribution of Iceland's mineral and mineral-related industries to the GNP continued to be mainly by industries supported by inexpensive electric and geothermal power, such as aluminum, ferroalloys, and diatomite. There was also production of minor amounts of other industrial minerals. In 1982, the contribution of the mineral industry to the GNP amounted to 3.2%, of which 70% was aluminum; 25% was ferrosilicon; and most of the rest was diatomite, cement, fertilizer, and salt.

Important events in the mineral industry of Iceland in 1982 were the commissioning of a new hydroelectric plant, record utilization of geothermal heat for space heating, and a continued stalemate in the dispute between the Government and the owners of Icelandic Aluminum Co. Ltd. (ISAL).

PRODUCTION

There was no important change in the production of minerals and related products in 1982, which remained as before aluminum, ferroalloys, cement, diatomite, and pumice. Mineral production for 1978-82 is shown in table 1.

Table 1.—Iceland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
Aluminum metal, primary	73,800	72,145	73,111	74,577	61,500
Cement, hydraulic thousand metric tons	134	127	122	122	28
Diatomite	20,020	21,288	18,150	19,840	24,965
Iron and steel ferroalloys: Ferrosilicon	--	15,000	25,309	33,612	41,545
Nitrogen: N content of ammonia[e]	7,000	7,000	7,000	7,000	8,000
Pumice	8,497	24,462	36,000	33,945	8,700
Salt	--	--	53	50	100
Sand and gravel:					
Calcareous thousand cubic meters	107	180	109	114	120
Basaltic cubic meters	10,800	6,200	4,900	5,000	5,300
Stone:					
Crushed and broken do	28	25	24	21	21
Scoria do	85	110	[e]95	98	104
Silica dust	--	4,400	4,400	4,900	4,200

[e] Estimated. [p] Preliminary.
[1] Table includes data available through June 14, 1983.

TRADE

There was no significant change in Iceland's modest foreign trade in minerals in 1980-81, as shown in tables 2 and 3. Minerals amounted to less than 5% of the total, which was dominated by fish and fish products.

Table 2.—Iceland: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, unwrought	67,318	63,187	--	Switzerland 14,394; West Germany 12,745; United Kingdom 11,355.
Iron and steel: Metal:				
Scrap	2,906	3,125	--	All to Norway.
Ferroalloys, ferrosilicon	25,309	32,082	10,995	United Kingdom 8,280; West Germany 7,781; Italy 1,976.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	3,215	--		
Other: Base metals including alloys, scrap	336	566	--	Netherlands 207; Denmark 204; United Kingdom 122.
NONMETALS				
Abrasives, n.e.s.: Natural, pumice	48,198	33,945	--	Denmark 17,972; Norway 15,951.
Diatomite and other infusorial earth	18,149	19,836	--	West Germany 5,546; Denmark 2,667; Italy 1,894.
Salt and brine	--	5	5	

Table 3.—Iceland: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified value	$177	$1,790	NA	NA.
Aluminum:				
Oxides and hydroxides	145,906	134,166	1	Australia 110,591.
Metal including alloys:				
Unwrought	110	15	--	United Kingdom 15.
Semimanufactures	1,153	1,173	11	Norway 281; West Germany 254; Switzerland 177.
Chromium: Oxides and hydroxides	2	3	--	All from West Germany.
Colbalt: Oxides and hydroxides value	$419	$138	--	All from United Kingdom.
Copper: Metal including alloys:				
Unwrought	1	2	--	All from Denmark.
Semimanufactures	184	192	29	West Germany 62; Sweden 28; United Kingdom 27.
Gold: Metal including alloys, unwrought and partly wrought value	$141,407	$137,290	$40,485	Switzerland $44,754; Netherlands $21,206; West Germany $18,039.
Iron and steel:				
Iron ore and concentrate: Excluding roasted pyrite	5,600	15,571	--	All from Norway.
Metal:				
Scrap kilograms	400	--		
Pig iron, cast iron, related materials	279	588	--	France 358; Sweden 115; Norway 80.
Ferroalloys: Unspecified	--	10	--	All from West Germany.
Steel, primary forms	206	1,022	57	Norway 645; Sweden 202; Canada 106.
Semimanufactures:				
Bars, rods, angles, shapes, sections	24,156	18,262	3	Norway 10,542; Netherlands 2,213; West Germany 1,677.
Universals, plates, sheets	17,657	14,373	7	Belgium-Luxembourg 3,316; Sweden 2,747; Norway 2,698.
Hoop and strip	463	501	--	West Germany 237; Belgium-Luxembourg 107; Denmark 69.
Rails and accessories	22	24	--	Norway 12; West Germany 10.
Wire	240	370	1	Belgium-Luxembourg 160; France 146; Denmark 26.

See footnotes at end of table.

Table 3.—Iceland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Tubes, pipes, fittings	9,390	9,931	7	West Germany 3,525; Spain 1,553; Netherlands 1,279.
Castings and forgings, rough	172	161	--	United Kingdom 89; Denmark 67; Norway 4.
Lead:				
Oxides	29	31	--	West Germany 21; United Kingdom 5; Sweden 4.
Metal including alloys:				
Unwrought	286	271	--	All from Denmark.
Semimanufactures	13	14	(1)	West Germany 10; Denmark 3.
Magnesium: Metal including alloys:				
Unwrought	5	--		
Semimanufactures value	$25	--		
Mercury 76-pound flasks	3	6	--	West Germany 3.
Metalloids: Unspecified	21	26	--	Norway 25.
Nickel: Metal including alloys:				
Semimanufactures	1	1	(1)	Mainly from Ireland.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value	$302,254	$206,142	$26,164	Switzerland $140,044; West Germany $26,164; Netherlands $12,256.
Silver:				
Waste and sweepings[2] do	$2,306	--		
Metal including alloys, unwrought and partly wrought do	$301,125	$137,428	--	West Germany $77,802; United Kingdom $14,459; Netherlands $14,321.
Tin: Metal including alloys:				
Unwrought	1	1	--	Mainly from Denmark.
Semimanufactures	10	9	--	Denmark 5; United Kingdom 3; West Germany 1.
Titanium: Oxides	1,044	1,121	--	United Kingdom 901; West Germany 170; Norway 50.
Tungsten: Metal including alloys, all forms value	$2,464	$551	--	NA.
Zinc:				
Oxides	17	17	--	West Germany 15; Denmark 1; Norway 1.
Blue powder	3	--		
Metal including alloys:				
Unwrought	87	84	--	Norway 74; Belgium-Luxembourg 10.
Semimanufactures	r19	32	--	West Germany 22; Norway 5; United Kingdom 5.
Other:				
Oxides and hydroxides	6	5	--	West Germany 2; Norway 2.
Base metals including alloys, all forms	10	(1)	(1)	Mainly from Denmark.
NONMETALS				
Abrasive, n.e.s.:				
Natural: Corundum, emery, pumice, etc	7	1	--	All from Italy.
Grinding and polishing wheels and stones	29	33	2	West Germany 7; Sweden 7; Netherlands 3.
Asbestos, crude	5	7	--	China 4; Denmark 2; West Germany 1.
Barite and witherite	36	56	--	West Germany 44; Denmark 12.
Boron materials:				
Crude natural borates	5	20	--	All from Denmark.
Oxides and acids kilograms	800	300	--	NA.
Cement	9,516	5,177	5	Denmark 4,874.
Chalk	378	352	--	France 148; Norway 112; Switzerland 45.
Clays and clay products:				
Crude, unspecified	476	434	55	United Kingdom 212; Netherlands 101; Denmark 54.
Products:				
Nonrefractory	972	1,182	--	Italy 420; West Germany 315; Sweden 195.
Refractory including nonclay brick	3,262	1,636	3	United Kingdom 485; Denmark 430; France 317.
Cryolite and chiolite	2,000	1,900	--	All from Denmark.
Diamond:				
Gem, not set or strung value	$17,874	$27,541	$551	Belgium-Luxembourg $19,829; West Germany $3,167.
Industrial do	$20,071	$7,436	--	Belgium-Luxembourg $7,298.
Diatomite and other infusorial earth	3	30	(1)	Belgium-Luxembourg 25; United Kingdom 4.

See footnotes at end of table.

Table 3.—Iceland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Feldspar, fluorspar, related materials:				
Unspecified	100	(1)	--	NA.
Fertilizer materials: Manufactured:				
Ammonia	4,096	4,846	--	Norway 4,838; Netherlands 5.
Nitrogenous	87	4,286	--	Norway 4,174; West Germany 100; Denmark 12.
Phosphatic	2,045	1,500	--	All from Netherlands.
Potassic	7,199	8,384	--	East Germany 5,696; Belgium-Luxembourg 2,687.
Unspecified and mixed	32,010	37,542	1	Norway 22,823; Netherlands 8,430; Belgium-Luxembourg 4,977.
Graphite, natural kilograms	500	300	--	NA.
Gypsum and plaster	9,501	8,311	1	East Germany 7,209; Sweden 1,078; West Germany 13.
Halogens:				
Chlorine	95	93	--	Denmark 91; Sweden 1.
Unspecified value	$3,198	$689	--	NA.
Lime	741	581	--	United Kingdom 375; West Germany 188; Denmark 15.
Magnesium compounds: Other	--	1	--	All from Austria.
Mica:				
Crude including splittings and waste	5	7	--	All from Norway.
Worked including agglomerated splittings	1	1	--	All from West Germany.
Nitrates, crude	6	--		
Pigments, mineral: Iron oxides and hydroxides, processed	48	42	--	Denmark 17; West Germany 10; Spain 3.
Precious and semiprecious stones other than diamond:				
Natural value	$4,500	$1,928	--	NA.
Synthetic do	$9,608	$20,015	--	Belgium-Luxembourg $10,879; West Germany $5,646; Hong Kong $1,928.
Salt and brine	105,556	77,810	1	Spain 61,390; Tunisia 14,150; West Germany 968.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	26	56	--	West Germany 50; Denmark 4; Italy 2.
Sodium carbonate, natural and manufactured	1,481	1,224	--	East Germany 800; West Germany 167; Netherlands 102.
Sodium hydroxide	653	620	--	Belgium-Luxembourg 279; Denmark 150; West Germany 67.
Sodium sulfate, natural and manufactured	84	74	NA	West Germany 60; Denmark 8.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	74	117	--	Sweden 47; India 25; Italy 21.
Worked	42	226	(1)	Italy 174; Denmark 20; Finland 17.
Dolomite, chiefly refractory-grade	120	94	--	All from Norway.
Gravel and crushed rock	322	299	--	Sweden 268; West Germany 26.
Limestone other than dimension	16	71	--	All from Denmark.
Quartz and quartzite	41,335	74,851	23	Norway 69,227; Canada 5,558; Denmark 30.
Sand other than metal-bearing	267	367	83	Denmark 84; United Kingdom 66; Netherlands 40.
Sulfur:				
Elemental:				
Crude including native and byproduct	50	--		
Colloidal, precipitated, sublimed	5	3	--	Mainly from West Germany.
Dioxide	1	4	--	Mainly from Denmark.
Sulfuric acid	388	72	--	Denmark 35; Netherlands 34; Australia 2.
Talc, steatite, soapstone, pyrophyllite	106	104	--	Norway 99; Denmark 4.
Other:				
Crude	24	13	--	Sweden 6; Denmark 5; Finland 2.
Slag and dross, not metal-bearing	1,300	--		
Oxides and hydroxides of barium, magnesium, strontium	1	1	--	Mainly from Denmark.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	3,969	3,042	(1)	Spain 1,793; Austria 602; West Germany 309.

See footnotes at end of table.

Table 3.—Iceland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	797	969	956	Belgium-Luxembourg 10; Netherlands 2.
Carbon: Carbon black	1	10	--	Norway 9.
Coal:				
Anthracite	12,243	20,238	6,696	Belgium-Luxembourg 10,141; Poland 3,298.
Bituminous	36	3,757	--	Belgium-Luxembourg 3,754.
Coke and semicoke	16,403	26,281	--	Norway 16,970; United Kingdom 5,632; Finland 3,636.
Hydrogen, helium, rare gases	6	5	--	Denmark 4.
Peat including briquets and litter	33	1,033	--	Finland 991; Denmark 41.
Petroleum and refinery products:				
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	9,669	11,264	--	Netherlands 10,370; Portugal 731.
Gasoline:				
Aviation do	r770,518	852,433	--	U.S.S.R. 507,603; Netherlands 162,478; Portugal 153,294.
Motor do	30,201	17,638	--	Netherlands 14,909; West Germany 2,584.
Mineral jelly and wax do	3,690	1,550	--	West Germany 850; United Kingdom 527; Netherlands 87.
Kerosine and jet fuel do	r438,425	362,382	15	Netherlands 268,538; Norway 52,677; Belgium-Luxembourg 41,075.
Distillate fuel oil thousand 42-gallon barrels	1,723	1,664	--	U.S.S.R. 657; West Germany 359; Netherlands 283.
Lubricants 42-gallon barrels	r50,316	46,179	224	United Kingdom 24,983; Netherlands 11,886; Belgium-Luxembourg 3,612.
Nonlubricating oils do	r3	(1)	--	NA.
Residual fuel oil thousand 42-gallon barrels	1,197	1,164	--	U.S.S.R. 982; Netherlands 98; Denmark 84.
Bitumen and other residues 42-gallon barrels	58,775	79,725	606	Sweden 59,933; United Kingdom 11,126; Norway 7,872.
Bituminous mixtures do	12,029	2,066	103	Netherlands 576; Denmark 430; Italy 388.
Tars and other crude chemicals derived from coal, gas, and petroleum	r946	539	(1)	West Germany 244; Denmark 140; Netherlands 103.

rRevised. NA Not available.
1Less than 1/2 unit.
2May include waste and sweepings of other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Aluminum production at the 85,000-ton-per-year plant of ISAL decreased about 18% compared with that of 1981. However, as aluminum prices declined, the value of exports was expected to be down by 17%, and stocks were up to about 40% of the annual production.

The 2-year-old dispute between the Government and Swiss Aluminium Ltd., owner of ISAL, over charges for bulk electricity to the company's Straumsvik smelter, continued. There was Icelandic concern, across the political spectrum, that the rate should be doubled, even tripled, but a five-member advisory panel was dissolved when it could not agree on a 20% preliminary hike. In 1982, the rate for power to the smelter was 6.45 U.S. mills per kilowatt hour, according to a 1966 contract which stipulates that both parties must agree to any change in the rate.

Ferroalloys.—Marketing prospects for ferrosilicon were poor in 1982, the second full operating year for Icelandic Alloys Ltd., owned by the Government (51%) and Elkem AS, Norway (49%), after the company's plant had reached the agreed capacity of 55,000 tons per year, with two furnaces. In April, the Minister of Energy introduced a bill for bailout measures to keep the compa-

ny viable; raising the state's share capital from $13.2 million to $16 million and underwriting credits for financing operations.

Silicon.—The Althing (Parliament) passed a bill authorizing the Government to build a silicon reduction plant in Reydarfjördur, a village with 700 inhabitants located on Iceland's east coast. The Government's equity share is to be at least 51% and Government appointees must constitute the board's majority. Japanese and Federal Republic of Germany parties were reportedly ready to buy 70% of the plant's output, with 7,500 and 70,000 tons per year, respectively.

NONMETALS

Diatomite.—The recent bankruptcy filing by the Denver, Colo., United States, based Manville Corp. has not affected the operation of the Lake Myvatn diatomite plant jointly owned mainly by the Government (52%) and Manville (39%) under the name of Kislidjan H.F. Feedstock for the plant is diatomaceous earth pumped from the lake and geothermal steam from boreholes is used in the processing.

Fertilizer Materials.—The state fertilizer plant at Gufunes near Reykjavik had financial difficulties with foreign financing, and was seeking Government financing arrangements that could alleviate dependence on foreign banks.

Sodium Chloride.—The Icelandic Steamship Co. delivered seawater to Bio Maris, a Hamburg, Federal Republic of Germany, health food producer, for production of sea salt.

A scheme to develop a sizable common-salt industry on the Reykjanes Peninsula in southwest Iceland was approved by the Government in 1981. Government participation of 25% is a condition of the scheme and both feed-stock and energy are to be obtained from drillholes emitting superheated brine derived from seawater seeping through permeable bedrock strata. A drive was to be launched to raise the private capital component of the venture.

MINERAL FUELS

In 1982, hydroelectric and geothermal energy supplied 64% of Iceland's energy needs; the remainder was supplied by imported petroleum products and some coal, both mainly from the U.S.S.R. and from Western Europe. Supply and consumption of fuel and power in 1981-82 is shown in table 4.

Table 4.—Iceland: Supply and apparent consumption of fuels and power for 1981 and 1982

(Million tons of standard coal equivalent)

	Total energy	Petroleum products	Hydro-electric	Geother-mal[e]
1981:				
Production[1]	1.4	--	0.5	0.9
Imports	.8	0.8	--	--
Apparent consumption	2.2	.8	.5	.9
1982:[p]				
Production[1]	1.4	--	.5	.9
Imports	.8	.8	--	--
Apparent consumption	2.2	.8	.5	.9

[e]Estimated. [p]Preliminary.
[1]Primary energy only.

Source: Central Bank of Iceland, Economic Statistics Quarterly. V. 4, No. 1, 1983, p. 25.

Geothermal Energy.—In 1981, for the second year, more than 75% of Iceland's population had geothermal space heating, with 27 major district heating systems operating in Iceland. Most of these tap low-temperature fields, with boreholes that are 2 kilometers or more below the surface and are away from the main volcanic zone that, as part of the mid-Atlantic ridge, stretches across the country from the northeast to the southwest.

At the end of 1981, Iceland's technically exploitable geothermal energy was estimated at 3,500 peta joules per year, of which only about 0.75% was being utilized.

Hydroelectric Power.—A third unit of the Hrauneyjafoss hydroelectric plant went onstream in January, raising the capacity of the National Power Co. (NPC) to 659 megawatts, compared with 329 megawatts

in 1973. The plant was linked to the west by a 150-kilometer-long transmission line to Hvalfjördur, north of Reykjavik. The cost of the project was $17 million.

According to plans, a transmission line is to be completed in 1983 between the Sigalda powerplant in the west and Höfn on the Hornafjördur in the southeast, closing a 250-kilometer gap, the last in the power grid system encircling Iceland.

At the beginning of the year, NPC formally took over generating and distribution facilities that were formally operated by the State Electric Power Works. According to a separate agreement, NPC and the Laxa River Utility, jointly owned by the Government and the city of Akureyri in Northern Iceland, were to merge in mid-1988. Organized in 1964, NPC was originally a 50-50 partnership of the national Government and the city of Reykjavik. At that time, its distribution network was limited to the southwest region.

Petroleum.—Over the next 5 years, Norway is to spend about $18 million in a project to map the geology of a 50-square-mile ocean area near the Norwegian Island of Jan Mayen, about 300 miles northeast of Iceland. According to a 1980 bilateral agreement, Iceland will have a 25% share of the seabed resources discovered as a result of echo soundings on the Norwegian side of the demarcation line between the Icelandic and Norwegian areas of the Continental Shelf.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from new Icelandic krona (IKr) to U.S. dollars at the rate of IKr68.0=US$1.00.

The Mineral Industry of India

By Gordon L. Kinney[1]

This year was difficult for the Indian economy. Plagued by drought, stagnant industrial production, labor unrest, and weak export growth, there was little change in gross national product in real terms. During fiscal year (FY) 1980 and FY 1981, the economy had grown at a rate of 8% and 6%, respectively, yielding an average of less than 5% for the first 3 years of the sixth 5-year plan (1980-85). Average per capita income for India's population of 707 million was about $222[2] and was among the lowest in the world.

Industrial growth was sluggish, about 2.8%, substantially less than the 8.6% rate of 1981. The slowdown was caused by a number of factors, including the decline in agricultural income, an extended textile strike, continuing power shortages in many States, a tight credit policy to curb inflation, and the general worldwide recession, which slowed export demand.

Overall, the infrastructure and basic industries performed best. Salable steel production lagged despite deregulation of prices and remained about static for the year. The Government's index of infrastructural industries—electricity, coal, steel, petroleum refinery output, crude oil, and cement—which account for nearly one-quarter of the overall index, recorded an overall growth of 8.4% in FY 1982 compared with 13.7% in FY 1981.[3]

India's public sector corporations dominate many of the basic industries and traditionally have significant losses. In FY 1981, however, they earned an aftertax profit of $503 million and in FY 1982 increased this to $622 million. The turnaround was due to the introduction of more realistic pricing policies. Nevertheless, several of the large public companies engaged in engineering and production of coal, fertilizers, and the nonferrous metals continued to operate at a financial loss.

The FY 1983 annual plan, which specifies the priorities for public investment, called for total expenditures of $26.4 billion, up 21.5% over that of FY 1982. Nearly 30% of the expenditures was allocated to the energy sector, $4.8 billion to power and $2.9 billion to petroleum. Agriculture and irrigation accounted for 21.5%; transport and communications, 15%; and industry and minerals, 13.7%.

In general, India's mineral industry can be characterized by several broad generalizations:

1. Mineral activity in India, including fuels, is predominantly in the public sector. For example, 100% of the coal, oil, copper, lead, zinc, and gold production and a significant proportion of nitrogen fertilizer; bauxite, chromite, iron, and manganese ores; and steel and aluminum metal comes from Government-owned companies. Public sector involvement likely will increase in the future, particularly in bauxite and iron ore production.

2. With the exception of a few minerals that are produced in sufficient quantities for export, India's mineral production is for domestic consumption.

3. Major emphasis in the next few years will be on increasing the production of mineral fuels, with natural gas beginning to increase in relative importance.

4. The major problems facing the nonfuel mineral sector in the next few years will be securing an adequate, reliable source of power and obtaining sufficient financial resources for expansion.

5. In terms of value, coal and petroleum constituted about 88% of Indian mineral production.

Despite a 7% increase in electricity generation, lack of sufficient power in the right places was the principal constraint on Indian economic growth. For the economy as a whole, it was estimated that demand ex-

ceeded electrical supply by over 9% in FY 1982. The situation was particularly serious in Tamil Nadu, Gujarat, and Rajasthan where the State Electric Boards were forced to repeatedly impose power cuts of 50% or more. Industrial operations suffered accordingly. Under these conditions, the mineral industry was inordinately hard hit. The aluminum, copper, zinc, steel, nitrogen fertilizer, and cement sectors were particularly vulnerable to physical damage to capital equipment when confronted by unannounced power outages. Many mineral-based companies have installed or were planning to install their own captive generating plants to ensure a stable power supply and continued production.

Although overall investment in the power industry was adequate, power shortages occurred because of delays in implementing power projects, underinvestment in transmission and distribution systems, and low capacity utilization because of poor management.

In FY 1982, additional generating capacity amounted to 3,060 megawatts compared to a target of 3,500 megawatts, and the average plantload factor was below 50%. To remedy the situation, the Government has taken a number of steps to improve the management and financial performance of the State Electric Boards, which are directly responsible for the power sector, and it has initiated several very large thermal power projects with foreign technology and concessional financing. Even if these measures prove successful, it is unlikely that the situation will improve soon, and power shortages will continue to be a major constraint on industrial growth.

PRODUCTION

The total value of mineral production has risen steadily in recent years, from $3.8 billion in 1980 to $3.9 billion in 1981 to $4.8 billion to $5.0 billion currently. Of the 1982 total, mineral fuels accounted for 88.2%; nonmetallic minerals, 6.3%; and metallic minerals, only 5.5%. In terms of value of output, coal and lignite were foremost, followed by crude oil and natural gas, iron ore, limestone, copper ore, phosphate rock, gold, and manganese ore.

The State of Bihar occupied the leading position in value of mineral production, accounting for 25% of the total. The Bombay High offshore oil and gas fields have moved into a position of second place, surpassing the traditionally important States of Madhya Pradesh, Assam, and West Bengal.

The proportional value of mineral fuels in overall mineral production was likely to rise in the next few years as oil and natural gas output from Bombay High and satellite fields reaches its peak by 1985. To keep production from declining after that period, it is vitally important for India in the next few years to find and develop new oil deposits.

Crude oil production climbed to a new record high and accounted for about 60% of India's needs. Coal output also increased significantly, but transport problems led to a large supply of coal at the minehead awaiting shipment.

In general, production of most of the major minerals changed only modestly during the year, with about as many increasing as decreasing. India continued to be the world's principal source of sheet mica. Among market economy countries, it ranked second or third in production of garnet, kyanite, rare-earth minerals, and nitrogen fertilizer; fourth in zircon; and fifth in barite. In addition, it was among the top nine producers of iron ore, chromite, manganese, magnesite, and cement.

Table 1.—India: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Bauxite, gross weight ----- thousand tons--	1,663	1,952	[r]1,785	1,923	1,854
Alumina, gross weight ----------do----	480	493	[e]500	[e]500	500
Metal, primary----------	213,729	211,428	184,838	212,844	216,679
Cadmium metal ----------	113	166	89	113	131
Chromium: Chromite, gross weight----------	266,293	309,841	319,538	334,681	339,196

See footnotes at end of table.

Table 1.—India: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
METALS —Continued					
Copper:					
Mine output, metal content	r26,600	r27,700	27,600	25,200	24,000
Metal:					
Smelter	19,481	21,455	28,489	25,743	32,585
Refined	r11,754	14,707	17,021	14,887	15,066
Gold metal, smelter troy ounces	89,186	84,781	78,834	79,875	71,935
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	38,838	39,859	r41,936	41,354	40,902
Iron content do	24,313	24,952	r26,252	25,888	25,605
Metal:					
Pig iron do	9,432	8,748	r8,493	9,474	9,600
Ferroalloys:					
Ferrochrome	21,545	22,249	16,012	31,066	40,244
Ferromanganese	219,993	186,803	162,650	208,836	150,707
Ferrosilicon	52,275	53,087	42,606	60,253	36,060
Ferrosilicochrome	3,892	3,851	4,037	4,408	e4,000
Other	3,634	2,844	535	9,074	e14,000
Steel, crude:					
Steel ingots thousand tons	9,917	9,936	r9,358	10,300	10,628
Steel castings do	e70	65	e65	e80	87
Total do	e9,987	10,001	r e9,423	e10,380	10,715
Semimanufactures:[3]					
Angles, shapes, sections do	1,040	e1,000	e1,000	NA	NA
Bars and rods do	2,300	e2,200	e2,200	NA	NA
Plates and sheets:					
Uncoated do	1,062	e1,100	e1,000	NA	NA
Galvanized do	194	e200	e200	NA	NA
Tinplate do	90	e100	e100	NA	NA
Hoop, strip, strapping, skelp do	1,153	e1,100	e1,100	NA	NA
Rails and accessories do	452	400	e350	NA	NA
Wire do	351	234	e240	NA	NA
Special steels, not further specified do	422	518	e550	NA	NA
Total do	7,064	6,852	e6,740	NA	NA
Lead:					
Mine output, metal content	12,840	15,960	12,720	15,320	16,636
Metal, refined:					
Primary	10,059	9,820	14,846	14,325	14,413
Secondary	10,900	10,800	10,732	11,081	8,780
Total	20,959	20,620	25,578	25,406	23,193
Magnesium	23	28	13	15	e15
Manganese ore and concentrate, gross weight thousand tons	1,619	1,771	1,645	1,526	1,448
Rare-earth metals: Monazite concentrate, gross weight[e]	3,272	3,254	r3,395	3,704	4,000
Selenium kilograms	5,151	4,596	4,148	4,104	e5,000
Silver, mine and smelter output thousand troy ounces	388	370	366	555	463
Titanium concentrates, gross weight:					
Ilmenite	3161,536	3146,843	3167,900	188,828	NA
Rutile	35,660	34,940	35,360	8,752	NA
Tungsten, mine output, metal content	21	18	22	18	25
Zinc:					
Mine output, concentrate:					
Gross weight	66,019	71,774	r46,489	52,876	52,839
Metal content	36,310	39,476	26,457	29,082	29,060
Metal:					
Primary	59,354	63,326	43,627	57,434	52,571
Secondary	NA	NA	234	200	e200
Total	59,354	63,326	43,861	57,634	52,771
Zirconium concentrate: Zircon, gross weight	11,167	12,180	14,820	12,400	e12,000
NONMETALS					
Abrasives, natural, n.e.s.:					
Corundum, natural	1,082	909	1,454	1,292	1,355
Garnet	2,467	6,820	3,742	3,176	5,429
Jasper	2,631	3,301	4,117	3,356	e3,500
Asbestos	24,623	32,094	31,253	24,515	26,761
Barite	388,582	490,699	434,015	353,362	325,368

See footnotes at end of table.

Table 1.—India: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Bromine, elemental	460	300	334	350	e350
Cement, hydraulic thousand tons	19,560	18,264	17,700	20,760	22,498
Chalk	74,813	79,786	87,142	85,309	87,057
Clays:					
Ball clay	96,552	128,090	125,457	118,635	114,782
Diaspore	4,909	6,437	5,504	6,099	5,802
Fire clay	725,000	789,291	656,279	791,105	769,495
Kaolin:					
Direct salable, crude thousand tons	304	379	349	406	531
Processed do.	114	116	97	100	e100
Total do.	418	495	446	506	e631
Other do.	71	81	80	80	e80
Diamond:					
Gem[e] thousand carats	14	14	12	14	12
Industrial[e] do.	2	2	2	2	2
Total do.	16	16	14	16	14
Feldspar	51,675	50,157	58,610	59,395	44,854
Fluorspar:					
Concentrates:					
Acid-grade	9,678	10,991	12,349	13,346	12,407
Metallurgical-grade	4,349	6,369	4,809	5,374	5,710
Total	14,027	17,360	17,158	18,720	18,117
Other fluorspar materials (graded)	3,519	4,081	4,049	4,185	6,785
Gem stones excluding diamond:					
Agate (including chalcedony pebble)	2,268	2,164	1,379	1,476	1,062
Emerald, crude carats	35,085	3,760	6,600	1,000	
Garnet kilograms	4,912	5,035	3,726	1,539	2,249
Graphite	63,784	52,821	48,795	56,249	52,376
Gypsum thousand tons	884	877	856	943	970
Kyanite and related materials:					
Andalusite	225	--	--	146	236
Kyanite	30,897	40,709	46,522	38,283	33,951
Sillimanite	13,471	16,105	12,987	10,254	13,066
Lime[e]	200,000	408,000	400,000	400,000	400,000
Magnesite	414,166	384,665	385,104	453,410	407,071
Mica:[4]					
Exports:					
Block	1,329	1,123	e1,180	e1,000	e1,100
Film and book for M cuttings	r76	r264	e85	e100	e200
Splittings	3,968	4,155	e3,610	e3,600	e4,000
Scrap	9,334	7,791	e13,910	e14,000	e8,000
Powder	8,518	4,393	e8,000	e7,000	e5,000
Manufactured	396	390	e300	e300	300
Total	23,621	18,116	e27,085	e26,000	e18,600
Domestic use (all forms)[e]	3,000	3,000	3,000	3,000	3,000
Total mica	26,621	21,116	e30,085	e29,000	e21,600
Nitrogen: N content of ammonia[3] thousand tons	2,220	2,256	2,221	3,193	3,450
Phosphate rock (including apatite)	789,270	681,486	540,932	561,944	559,986
Pigments, mineral, natural: Ocher	77,450	99,036	86,198	79,631	84,789
Pyrites, gross weight	63,781	67,172	83,806	57,598	55,853
Salt:					
Rock salt thousand tons	4	4	5	4	4
Other do.	6,696	7,032	8,004	8,928	7,408
Total do.	6,700	7,036	r8,009	8,932	7,412
Sodium carbonate do.	r567,600	r542,297	r524,644	613,000	e600,000
Stone, sand and gravel:[5]					
Calcite	27,983	30,161	24,028	21,167	19,101
Dolomite thousand tons	1,969	2,077	1,887	1,955	2,133
Limestone do.	30,915	30,586	28,215	30,873	33,462
Quartz and quartzite do.	390	322	240	282	332
Sand:					
Calcareous do.	932	772	772	685	669
Other do.	1,620	1,670	1,532	e1,400	1,254
Slate	14,319	19,399	11,406	9,187	4,770

See footnotes at end of table.

Table 1.—India: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Sulfur:					
Content of pyrites	25,500	26,869	33,522	23,039	22,341
Byproduct:					
From metallurgical plants[e]	115,000	115,000	115,000	92,000	100,000
From oil refineries	[r]8,101	3,665	5,065	4,170	13,066
Total	[r]148,601	145,534	153,587	119,209	135,407
Talc and related materials:					
Pyrophyllite	38,883	34,708	[r]34,102	38,420	NA
Steatite (soapstone)	298,000	352,000	[r]335,455	329,149	300,338
Vermiculite	1,886	3,109	3,428	3,624	2,068
Wollastonite	1,928	3,794	5,788	15,940	20,725
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	55,000	54,000	NA	NA	NA
Coal:					
Bituminous thousand tons	101,973	103,845	114,010	124,900	128,225
Lignite do	3,613	3,264	4,548	5,500	6,675
Total do	105,586	107,109	118,558	130,400	134,900
Coke:[e]					
Coke oven and beehive do	12,100	12,000	12,000	12,000	12,000
Gashouse do	47	100	100	100	100
Other, soft do	50	50	50	50	50
Total do	12,197	12,150	12,150	12,150	12,150
Gas, natural:					
Gross million cubic feet	97,823	100,000	82,530	[3]136,067	140,000
Marketable[6] do	61,129	66,957	50,661	[3]75,820	85,180
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	92,182	93,732	75,672	116,712	149,811
Refinery products:					
Gasoline do	12,891	12,775	12,393	22,691	NA
Kerosine do	19,515	20,440	18,440	22,529	NA
Jet fuel do	9,424	8,760			
Distillate fuel oil do	64,499	68,620	60,680	74,555	NA
Residual fuel oil do	38,601	42,340	41,845	46,307	NA
Lubricants do	3,403	2,920		2,849	NA
Other do	34,643	36,135	[e]57,642	42,176	NA
Refinery fuel and losses do	13,377	10,950		13,594	NA
Total do	196,353	202,940	[e]191,000	224,701	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Sept. 20, 1983.

[2]In addition to the commodities listed, other clays (bentonite, fuller's earth, and common clays), other gem stones (aquamarine, ruby, and spinel), and uranium are also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels. In 1975, production of 6,514 tons of uranium ore containing about 3 tons of U_3O_8 was reported from two mines, which was only a part of total national production. Moreover, reported production of stone and sand and gravel are clearly only partial figures and exclude a number of types of stone; the amounts reported are inadequate to provide sufficient aggregate for production of concrete from domestically produced and consumed cement, nor do they provide for other supplies of aggregate for road metal and other construction uses.

[3]Data are for fiscal year beginning Apr. 1 of that stated.

[4]Data supplied here (exports plus domestic use) are provided in lieu of officially reported production because the latter figures are evidently incomplete. Officially reported production figures are as follows, in metric tons: 1978—14,273; 1979—14,180; 1980—12,355; 1981—12,729; and 1982—12,961.

[5]Partial figures; for details, see footnote 2.

[6]Includes reinjected gas.

TRADE

The balance-of-trade deficit dropped more than 7% to $6 billion as exports increased nearly 12% compared with only a 3.5% increase of imports. The foreign commercial policy was more liberal than in the past, with an emphasis on efficient import substitution and technology transfer.

The value of mineral exports was slightly over $1 billion. Approximately 58% of this was small diamonds that were imported, cut

and polished, and then exported. Iron ore accounted for 30%, and mica, 3%, of mineral exports.[4]

India also exported several dozen minerals; the more important were chromite, manganese, titanium, barite, magnesite, and talc.

Petroleum was a key factor in the overall trade picture. As crude oil production has increased, the need to import less oil has led to reduced pressure on the balance-of-payments position. Petroleum imports as a percentage of total imports dropped to an estimated 33% in FY 1982. Petroleum imports as a percentage of total export earnings declined from 78.5% to 51.5%.

There is no import table in this year's chapter owing to a lack of official published trade data.

Table 2.—India: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	--	186	--	All to Indonesia.
Aluminum:				
Ore and concentrate	NA	131,587	--	U.S.S.R. 78,383; United Arab Emirates 34,784.
Oxides and hydroxides	NA	1,202	--	Indonesia 1,000.
Metal including alloys, all forms	NA	4,962	21	Bangladesh 2,930; U.S.S.R. 843; Sri Lanka 285.
Antimony: Ore and concentrate	4,507	812	--	Netherlands 558; Japan 119.
Cadmium: Metal including alloys, all forms	NA	25	--	All to United Kingdom.
Chromium: Ore and concentrate	236,017	129,981	--	All to Japan.
Cobalt: Oxides and hydroxides	NA	38	--	Iran 14; Kuwait 11.
Copper:				
Ore and concentrate	23,000	11,011	--	Mainly to Japan.
Sulfate	NA	15	2	Saudi Arabia 7; Bahrain 2; Malaysia 2.
Metal including alloys, all forms	1,143	2,205	1	Bangladesh 1,995.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite -- thousand tons	24,347	25,210	--	Japan 14,312; Romania 2,779; Republic of Korea 1,598.
Metal:				
Scrap	10,532	1,675	--	Japan 1,582.
Pig iron, cast iron, related materials	104,254	1,936	210	Australia 624; Nepal 349; Italy 345.
Ferroalloys:				
Ferrochromium	9,001	550	--	All to Japan.
Ferromanganese	52,681	400	--	All to United Kingdom.
Ferrosilicon	14,014	3	--	All to Japan.
Unspecified	--	11,308	--	Japan 9,998; Republic of Korea 1,220.
Steel, primary forms	49,242	7,675	--	U.S.S.R. 4,166; Nepal 2,517.
Semimanufactures:				
Bars, rods, angles, shapes, sections	101,745	29,267	2,164	Burma 8,127; Egypt 5,415; Bangladesh 1,476.
Universals, plates, sheets	11,697	7,473	36	U.S.S.R. 7,000; Nepal 254.
Hoop and strip	176	20	--	Kenya 10; Sri Lanka 5.
Rails and accessories	7,876	652	--	Iran 372; Sudan 131.
Wire	14,095	16,242	134	Nepal 7,521; Taiwan 2,297; Iraq 1,759.
Tubes, pipes, fittings	135,262	104,232	9,661	Saudi Arabia 26,889; Yemen (Sanaa) 10,092; Iraq 9,109.
Castings and forgings, rough	6,039	6,381	3,706	Canada 573; Saudi Arabia 466; Australia 387.
Lead:				
Oxides	NA	15	--	All to Fiji.
Metal including alloys, all forms	NA	10	--	Indonesia 6; Sri Lanka 2.
Manganese:				
Ore and concentrate	629,944	568,424	--	Japan 430,809; Taiwan 46,218; Czechoslovakia 26,335.
Oxides	NA	673	--	Philippines 290; Indonesia 150; Singapore 100.
Metalloids: Phosphorus	NA	127	40	Taiwan 30; Bangladesh 26.
Nickel: Metal including alloys, all forms	4	17	--	Bangladesh 11.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	3,813	--		
Tin: Metal including alloys, all forms	3	21	--	United Arab Emirates 16; Yemen (Sanaa) 5.
Titanium:				
Ore and concentrate	53,043	NA		
Oxides	--	238	234	Kenya 2.

See footnotes at end of table.

Table 2.—India: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
METALS —Continued				
Tungsten: Oxides and hydroxides	NA	15	--	All to Netherlands.
Zinc:				
Oxides	NA	250	33	Iraq 40; Philippines 40; Tanzania 30.
Metal including alloys, all forms	107	297	19	Sri Lanka 274.
Other:				
Ores and concentrates	22,416	1,321	15	Iraq 1,231.
Oxides and hydroxides	NA	625	(1)	Japan 402; Kenya 85.
Ashes and residues	NA	166	--	United Kingdom 150.
Base metals including alloys, all forms	218	22	10	Libya 9.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	347	1,065	--	Japan 680; Netherlands 200; Bangladesh 93.
Artificial: Corundum	NA	47	--	All to Republic of Korea.
Dust and powder of precious and semiprecious stones, excluding diamond	--	20	--	All to Bangladesh.
Grinding and polishing wheels and stones	1,939	3,462	23	Bangladesh 891; Taiwan 319; Japan 289.
Asbestos, crude	413	370	--	West Germany 142; United Arab Emirates 101.
Barite and witherite	338,312	341,348	130,367	Iraq 102,491; Mexico 48,997; United Arab Emirates 46,936.
Boron materials: Oxides and acids	--	69	--	Netherlands 62.
Cement	54,998	32,413	--	Nepal 32,345.
Chalk	NA	1,024	--	United Arab Emirates 301; Austria 300; Kuwait 151.
Clays and clay products:				
Crude	r21,434	20,547	4	Iraq 7,045; Japan 2,871; Bangladesh 2,798.
Products:				
Nonrefractory	NA	2213,330	73	Kenya 210,211.
Refractory including nonclay brick	NA	7,926	15	Republic of Korea 3,028; Bangladesh 2,694.
Diamond: Gem, not set or strung value, thousands	$436,432	$535,364	$177,249	Belgium-Luxembourg $117,865; Switzerland $74,534; Japan $64,371.
Feldspar, fluorspar, related materials:				
Feldspar	NA	182,272	--	Jordan 89,389; Philippines 80,000.
Fertilizer materials: Manufactured:				
Ammonia	NA	10	--	Mainly to United Arab Emirates.
Nitrogenous	NA	10,208	--	U.S.S.R. 5,243; Belgium-Luxembourg 4,921.
Potassic	NA	302	--	Malaysia 300.
Unspecified and mixed	NA	100	--	All to Nepal.
Graphite, natural	NA	3,476	50	Japan 1,191; Taiwan 870; Australia 379.
Gypsum and plaster	NA	9,223	--	Bangladesh 8,116.
Lime	2,072	480	--	Nepal 228; United Arab Emirates 111; Oman 100.
Magnesium compounds:				
Magnesite	5,429	6,788	1,503	Turkey 1,500; United Kingdom 1,045; Netherlands 897.
Oxides and hydroxides	--	11	--	Netherlands 10.
Mica:				
Crude including splittings and waste	12,635	11,551	1,936	France 1,992; Belgium-Luxembourg 1,988; Japan 1,611.
Worked including agglomerated splittings	4,025	15,755	1,128	United Kingdom 2,716; West Germany 1,795; Japan 1,595.
Pigments, mineral:				
Natural, crude	NA	371	--	Kenya 125; Iran 110; Philippines 57.
Iron oxides and hydroxides, processed	NA	172	--	United Kingdom 100; Singapore 20; Zambia 20.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$78,542	$38,100	$9,994	West Germany $5,015; France $3,832; U.S.S.R. $3,646.
Synthetic do.	$1,969	$457	$92	Italy $123; Switzerland $80; Singapore $45.

See footnotes at end of table.

Table 2.—India: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Salt and brine	30,196	47,363	--	Nepal 39,801; North Korea 7,000.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	NA	450	--	Australia 306; United Kingdom 129.
Sodium carbonate, natural and manufactured	NA	394	1	Nepal 259; Japan 100.
Sodium hydroxide	NA	689	--	Saudi Arabia 435; Peru 100.
Sodium sulfate, natural and manufactured	NA	6,742	--	Iran 6,300.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	219,671	341,928	1,226	Japan 171,197; Italy 63,861; West Germany 38,662.
Worked	10,541	13,550	--	United Arab Emirates 9,434; Japan 2,557.
Dolomite, chiefly refractory-grade	NA	8,151	--	Bangladesh 6,887; United Arab Emirates 878.
Gravel and crushed rock	NA	30,761	--	Maldives 25,293; Kuwait 2,483.
Limestone other than dimension	NA	194,966	--	Bangladesh 164,234.
Quartz and quartzite	NA	16,092	--	Japan 15,537.
Sand other than metal-bearing	NA	4,229	274	United Arab Emirates 1,736; Netherlands 691.
Sulfur:				
Elemental:				
Crude including native and by-product	NA	491	--	Sri Lanka 391; Kenya 100.
Colloidal, precipitated, sublimed	NA	100	--	All to Kenya.
Sulfuric acid	NA	188	--	Oman 75; Kuwait 50; Libya 42.
Talc, steatite, soapstone, pyrophyllite	13,355	11,087	(1)	Kenya 2,977; Norway 1,480; United Kingdom 460.
Vermiculite	NA	3,117	1	Kuwait 1,716; Sri Lanka 700.
Other:				
Crude	NA	1,180	3	Italy 601; West Germany 246; Netherlands 102.
Slag and dross, not metal-bearing	NA	304	--	Japan 300.
Oxides and hydroxides of barium, magnesium, strontium	NA	190	--	Romania 90; Thailand 45; Libya 25.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	38,743	30,602	41	United Arab Emirates 19,642; Iraq 2,113; Qatar 1,611.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	122	--	All to Maldives.
Carbon: Carbon black	--	659	80	Tanzania 370; Thailand 80; Kenya 54.
Coal: All grades including briquets	93,220	113,877	--	Bangladesh 91,886; Nepal 21,986.
Coke and semicoke	433	2,302	--	All to Nepal.
Petroleum refinery products:				
Distillate fuel oil 42-gallon barrels	NA	813,998	--	NA.
Unspecified ----------do----	NA	25,256	--	NA.

[r]Revised. NA Not available.
[1]Less than 1/2 unit.
[2]Excludes unreported quantity valued at $491,204.

COMMODITY REVIEW

METALS

Bauxite, Alumina, and Aluminum.— Electric power shortages continued to be the main constraint on aluminum production. Estimated capacity utilization was 65% for the industry.

Domestic demand for aluminum has slumped since FY 1980. Projected sales for FY 1982 were 235,000 tons. The decline was largely due to the inability of the State Electric Boards, the major consumers of electric conductor-grade metal, to place orders because of financial constraints.

Bharat Aluminium Co. (BALCO), in an effort to increase its capacity utilization, obtained permission from the Indian Government in December, to set up a captive 270-megawatt thermal powerplant (four 67.5-megawatt units) at Risda village adja-

cent to the Korba aluminum complex. The plant will cost $280 million. No funding was available for the powerplant, however, in FY 1982, and only $1 million was allocated in the FY 1983 budget.

Construction of its own power source appeared to be the only way that BALCO could commission its two idle 25,000-ton-per-year potlines. These lines were completed in December 1977 and September 1978 but have never been charged because of the lack of power from the State-owned grid. During the year, BALCO deliberately reduced its production of alumina to keep in balance with its metal production and to avoid excessive stockpiles.

Revamping of the alumina plant at Korba continued but at some escalation of costs. Estimated cost was revised to $6.5 million from the earlier allocation of $5 million. The work was rescheduled for completion in June 1983. The work will increase the operational capacity from 150,000 tons per year to the original capacity of 200,000 tons per year.

Development of the Gandhamardan bauxite deposit in Orissa as a source of raw material for Korba in the late 1980's was officially approved in July, and BALCO began development of the mine, which was scheduled to open in mid-1985.

Work was well underway at four of the five major components of the National Aluminium Co. Ltd.'s new Orissa aluminum complex. The $1.4 billion project was being aided both financially and technically by France. The technical know-how and design package for the work was supplied by the Péchiney Ugine Kuhlmann (PUK) Group. PUK will assist during construction and commissioning of the project and will also provide continued technical assistance for 3 years after commissioning of the project.

Land acquisition was completed and more than one-third of the site was graded at the alumina plant, smelter, and captive powerplant. Foundation work was started at the alumina plant in November. Access to the alumina plantsite at Damanjodi was behind schedule. Movement of heavy equipment could be delayed if this phase is not speeded up.

Two other negative factors were encountered during the year. Preliminary work on the captive coal mine and washery was delayed because of a financial problem. Work on the dedicated railroad between Damanjodi and the smelter at Angul (also referred to as Talcher smelter) was delayed and could cause additional problems with equipment deliveries and later raw material movement if not brought back on schedule.

In a project of this magnitude, spread over several widely scattered sites, management will have to be extremely diligent in preventing further construction delays. Each site of the complex is vital to the success of the overall operation. Any schedule breakdowns not quickly made up will jeopardize the timely startup of aluminum production.

Indian Aluminium Co. Ltd. (INDAL), the country's second largest primary aluminum producer, will merge with Mahindra and Mahindra Co. of Bombay subject to various governmental approvals. The move is designed to make INDAL a national company and allow it to expand its operations. At present, because the company is more than 50% owned by Aluminum Co. of Canada Ltd. (Alcan), it is classified as a foreign firm and is restricted in its activities. If the merger goes through, Alcan's equity in the new company will be reduced to 28%. With the merger, INDAL would become the third largest company in India.[5]

Hindustan Aluminium Co. Ltd. (HINDALCO) applied to the Government for permission to modernize and expand its facilities at Renukoot. Modernization of the existing smelter would be directed at lowering the consumption of electric power per ton of metal substantially below the present 16,500 kilowatts. HINDALCO's goal would also be to reduce consumption to less than 12,000 kilowatts per ton for its new potlines. Aluminum capacity would be increased from 120,000 to 187,500 tons per year.

Alumina capacity, currently at 170,000 tons per year, would be increased with technical assistance from Hungary to 340,000 tons per year at a cost of $40 to $50 million.

A third part of the plan involved the construction of the fifth and sixth generating units at the captive powerplant. The company has three units operating with a combined capacity of 202.5 megawatts. A fourth unit was scheduled to go online by mid-1983. The fifth and sixth units would bring HINDALCO's generating capacity to 375 megawatts, sufficient to operate the smelter at rated capacity.

Chromite.—India continued development of its chromium industry by expanding mine production and adding to its 30,000-ton-per-year ferrochromium production ca-

pacity. Construction of four export-oriented, charge-chrome (high-carbon, low-chromium ferrochromium) plants by three companies was underway.

Farthest along in construction was a 45,000-ton-per-year, charge-chrome plant located at Therubali, Koraput district of Orissa. Initially, it will use friable domestic chromite ore and Albanian chromite ore. This facility was being built by Indian Metals & Ferro Alloys Ltd. (IMFA), which also has applied for six mining leases to develop captive mines. The output will be exported through the Port of Visakhapatnam with marketing handled by Elkem AS of Norway, the company supplying the furnace for the plant.

IMFA has plans for setting up a captive 180-megawatt thermal powerplant. The plant would be built in stages and also supply the company's second plant as well.

Work on IMFA's second plant was in the site-preparation stage at yearend. The $34 million plant will have a capacity of 50,000 tons per year and will be located in Chouduar, Cuttack district, about 20 kilometers from Bhubaneshwar. Chromite for this plant will come from the six captive mines IMFA plans to establish. This plant will be operated as a separate company called Indian Charge Chrome Ltd., which was recently formed. Elkem will reportedly supply much of the equipment and hold about 20% of the equity.

The second company working on a new plant was Ferro Alloys Corp. Ltd. It will have a capacity of 50,000 tons per year and be located at Randia, Balasore district of Orissa. Captive mines at Boula and Kathpal will furnish the chromite raw material. The plant and mines will employ about 5,500 persons. The lower grade and friable ores (about 20% Cr_2O_3 content) will be beneficiated by gravity at Boula Mine. The 48%-Cr_2O_3-content concentrate will then be shipped 40 kilometers to Randia where it will be briquetted before smelting.

The plant will have a 45-megawatt-ampere, semiclosed, submerged arc electric furnace installed by M/s. Tanbe Kakoki Co. Ltd. of Japan. It will be equipped with a computer-controlled automatic raw materials feed system. Total plant cost will be $35 million to $40 million. The company will be dependent on Orissa State for its power supply. The 55%-chromium-content ferrochrome will be marketed mainly in the United States for stainless steel production. Marc Rich and Co. has guaranteed annual purchases of 35,000 tons for 10 years, with the remaining sales dependent on market conditions.

The State-owned Orissa Mining Corp. was the third company with a plant under construction. The plant will have a 50,000-ton-per-year capacity, will be located in Bamnipol in Keonjhar district, Orissa, and will use engineering technology from Outokumpu Oy of Finland. The Austrian firm Voest-Alpine AG will supply the equipment and assist in construction. The Orissa State cabinet has approved Euro-currency loan arrangements for the $38 million plant. The loan reportedly will total $21 million and be obtained from Austria, Finland, and the Federal Republic of Germany.

Copper.—Production of both smelter and refined copper showed encouraging increases compared with 1981 production levels. In addition, demand for copper in the same period continued to rise to the 80,000- to 90,000-ton level, necessitating continued sizable imports. Future demand was expected to reach 115,000 tons by FY 1984.

Production at Hindustan Copper Ltd.'s (HCL) facilities at Khetri in Rajasthan and at Ghatsila in Bihar were both hindered from further increases by electric power shortages, forcing cutbacks in several operations.

Both the Khetri and Ghatsila complexes handled the problem by keeping the smelters and refineries operating at the best efficiency for the power at hand and allowed the mine and concentrate outputs to lag. The overall production loss for the year was estimated by HCL at over 7,000 tons of metal.

The major development in the copper sector was the commissioning in May of the first stage of the Malanjkhand copper project after removal of 7.5 million cubic meters of overburden. The mine is located 90 kilometers northeast of Balaghat in Madhya Pradesh. The $125 million project was the country's first large-scale, open pit, hard-rock mine. The first stage has a design capacity of 1 million tons of ore per year. The mine was designed for production of 2 million tons per year of ore, equivalent to 24,000 tons of metal. After a trial running period, the mine and concentrator were formally inaugurated in November. HCL, the Government-owned copper monopoly, was very optimistic over the possibility of continued future development of this deposit.

The ore body has a strike length of 2,600

meters and an average width of 70 meters. Reserves within the designed pit area were 59 million tons at an average grade of 1.2% copper at 0.45% copper cutoff. The ore body was drilled in detail to 200 meters for the reserves calculations. An ore body of this type often extends to a depth of one-half the strike length. If this is the case at Malanjkhand, then the reserves will be far larger than the official figure. Published estimates run between 200 and 300 million tons.[6]

The concentrator was designed to produce 99,000 tons of 25% copper concentrate per year. A standard sulfide froth flotation circuit with forty-eight 8.5-cubic-meter and sixty-four 1.7-cubic-meter cells will separate the copper mineral from the gangue.

A considerable amount of lower grade primary sulfide must be moved to reach the main ore body. Much of this was being segregated during mining with the idea of extracting the copper values using heap leaching techniques. Studies were underway to assess the amenability of the ore to this process, which would be the first copper leaching operation in India.

The copper concentrate will be shipped to the existing smelter at Khetri, approximately 900 kilometers away, in Rajasthan. This will enable the smelter to operate on a more profitable basis as it has been operating at well under its 31,000-ton-per-year capacity. HCL planned to increase Khetri's capacity to 45,000 tons per year to handle all of the increased supply of concentrate.

The task of moving the concentrate from Malanjkhand to Khetri is illustrative of some of the difficulties of the Indian transport system. Currently, the concentrate is being trucked the entire distance, a journey of 4 days. In spite of the higher cost of road haulage, it was a more reliable mode than by railroad. Transport by rail would average 10 days and include handling the concentrate a second time where the rail gauge changes.

Malanjkhand was receiving about 55% of its power needs at yearend from the State power grid. Accordingly, it was installing two captive 4-megawatt generators, which will provide 60% of its normal requirements.

In other developments, the first-stage expansion of the Mosaboni Mine in Bihar was completed, raising capacity from 50,000 to 60,000 tons of ore per month. The second stage, raising capacity to 68,000 tons per month, was underway and scheduled for completion in April 1983.

HCL has proposed expansion of its smelter capacity at Ghatsila from 16,500 to 20,000 tons per year. It also would like to expand its refinery capacity at Ghatsila from 8,400 to 20,000 tons per year. A feasibility report for these projects has been submitted to the Government for approval.

The recently opened Phase I Rakha copper mine increased its output of ore to over 210,000 tons, well ahead of the year's target. Concentrator output was over 11,000 tons for FY 1982.

Gold.—Because of the need to supplement depleting ore reserves, public sector Bharat Gold Mines Ltd. (BGML) has, in close cooperation with the Geological Survey of India (GSI) and Mineral Exploration Corp. (MEC), continued exploration activities in various areas in search of new gold prospects. MEC has taken over exploratory mine development work at the Mallapakonda and Chigargunta Prospects, Chitoor district, Andhra Pradesh, after these were identified as auriferous ore-bearing areas by GSI. A plan for the speedy development of the Chigargunta prospect was still under consideration by the Government.

The Government approved commercial development and production from the Yeppamana Mine, Ramagiri Goldfield, in Anantpur district, Andhra Pradesh. Construction at the mine and on a 250-ton-per-day mill was progressing satisfactorily at yearend.

BGML's operations showed a small loss in FY 1981 and a much larger estimated loss in FY 1982. The losses were mainly due to lower international gold prices, lower gold yield per ton of ore, and a general increase in mining and materials costs.[7]

GSI was to begin a detailed survey for gold off the coast of northern Kerala. Existence of gold in Kerala's coastal waters, particularly in the river-mouth sediments of the Malabar region, was a recent discovery. GSI had ordered a sophisticated drillship to get a definite idea of the extent of the offshore deposit and to determine if an economically viable mining operation was possible.

Iron and Steel.—The five integrated steel plants under Steel Authority of India Ltd. (SAIL) were expected to produce 7.15 million tons of ingot steel and more than 5.7 million tons of salable steel in FY 1982. This compared very well with the equivalent record high FY 1981 production of 6.64 and 5.65 million tons, respectively. The first

part of the year was plagued by a continuation of severe power shortages in virtually all of SAIL's steel production facilities. There was a considerable improvement in supply of electric power after September, and this immediately resulted in improvement of production performance of the SAIL plants. These plants had a salable steel capacity of 7.20 million tons for a capacity utilization of about 80%, a substantial improvement over that of FY 1979 when only 63% of capacity was used. The SAIL plants that produce specialty and alloy steels added an estimated 60,000 tons of salable alloy steels.

The private sector Tata Iron and Steel Co. (TISCO) continued to operate at slightly over its rated capacity in FY 1981 and was expected to run at a similar rate through the end of FY 1982. The steel miniplants were expected to produce more than 2.1 million tons of ingot during FY 1982.

A slower annual growth rate in domestic steel demand than the projected rate of 9% for the sixth plan period (1980-85) hit the India steel producers in 1981 and 1982. Actual steel consumption in FY 1981, estimated at 9 million tons, was much below the forecast of 10.5 million tons. A mild recession faced by the major end-user industries, resulting from the restrictions on bank credit, sharply reduced internal steel demand in 1981-82. Steel consumption figures in India vary considerably because of the difficulty of determining at what point a steel is consumed. From 20% to 30% of the production of the integrated plants together with the entire output of the steel miniplants goes to the rerolling industry. A great deal of the total finished steel consumed in the country was supplied by the rerolling units, also called secondary producers. It is therefore a significant omission in the Indian consumption statistics that the actual pattern of production of the rerolling units has never been supplied in a meaningful form.[8]

The Indian steel producers raised the prices of steel products between 25% and 40% after the official controls on steel prices were removed in February 1981. As a result of the increases, the profitability of the major producers improved dramatically. The decrease in demand for steel toward the end of 1981 and into 1982, however, changed the price picture once more. By March 1982, the average market price had declined to well below the August 1981 level. The higher profits were reduced in the current year as prices continued to fall through most of the year and surplus stocks began to accumulate. Despite the sharp price fall, domestic producers were still unable to reduce their unsold stocks, which reached almost four times normal levels. This, in turn, tied up large amounts of working capital as the value of unsold stock reached an estimated $422 million.

The unrestricted imports of most varieties of steel permitted in 1981 were discontinued in 1982, and the selective steel imports were routed primarily through SAIL. SAIL's imports for the first half of FY 1982 were over 700,000 tons, but a major portion of this volume was delayed deliveries on 1981 contracts. The original plans to import 1.8 million tons of steel were modified in light of the market conditions and late deliveries. Considering the spillover of imports from the 1981 contracts, actual net imports should reach about 1.1 million tons in 1982.

The recession in the world steel industry and the continuing slump in domestic steel demand has not changed India's original steel development programs for the sixth plan. Planned expansion of steel capacity by an additional 3.5 million tons remained unchanged although the original $4.2 billion cost estimated for expansion during the sixth plan will fall far short of actual construction costs. Cost escalation for Bokaro and Bhilai—the two Soviet-aided integrated steel mills—has alone reached $1.3 billion.

The largest project currently underway was the construction of India's first shore-based integrated steel plant at Visakhapatnam, Andhra Pradesh. Construction was well underway during the year on the 3.4-million-ton-per-year plant, which will employ special coal-handling equipment, dry quenching of coke, and continuous casting of all steel. There was some concern among Indian companies that too many contracts for equipment were going overseas when the contracts could be fulfilled in India. Rashtriya Ispat Nigam Ltd.—the company set up to build and operate the plant—claimed contracts were awarded to best keep the overall project on schedule. The project will need to be fully funded each year for the tight construction schedule to be maintained.

SAIL has recognized the need for modernization and expansion of its 60-year-old Indian Iron and Steel Co. (IISCO) and three other mills built in the 1950's—British-aided Durgapur Steel Plant (DSP), the

German-aided Rourkela Steel Plant (RSP), and the Japanese-aided Alloy Steel Plant (ASP), also at Durgapur.

SAIL has approved the two-phased modernization program of $143 million for DSP recommended by the British consultant. The first phase will include an additional blast furnace complex and a new sintering plant, while phase two will provide a new oxygen steel melting shop with top-blown Linz-Donawitz (LD) converters, continuous casting mill, and a wire and rod mill. Two captive thermal power units of 60 megawatts each were already under construction during the year. Some of the power will be shared with ASP as well. Work on new coke oven batteries was also underway at DSP. A 165-ton-per-day battery was commissioned in November, and a second battery was being trial tested at yearend.

SAIL approved a phased modernization and expansion of RSP at a cost of $184 million. The $65 million first phase called for a new coke oven and sintering plant, plus improved coal preparation and handling to increase efficiency. The second phase will add a blast furnace and convert the open-hearth shop to larger capacity LD converters. Present annual capacity will increase from 1.8 to 2.5 million tons per year.

ASP at Durgapur has completed its first-phase expansion, increasing its annual capacity to 160,000 tons with installation of a new 50-ton electric arc furnace. SAIL has also approved a second-phase expansion at an estimated cost of $75 million, which will increase capacity to 260,000 tons by installation of a vacuum arc degassing unit, a vacuum oxygen decarburization unit, and a continuous slab-bloom caster. Phase two was expected to be completed by 1985. The main purpose of the ASP construction is to furnish a domestic supply of hot-rolled stainless steel for the Salem steel plant, which now imports its hot-rolled strips at a very high and unprofitable price.

A preliminary proposal was being considered for a long-term modernization and development program to double the present 1-million-ton-per-year capacity at IISCO. Soviet consultants have been requested to prepare a feasibility report. The old plant was urgently in need of at least a major modernization, but a shortage of funds has prevented any meaningful updating of equipment for the past several years.

The above projects for modernization and expansion underscore official intentions and immediate needs, but the available domestic investment funds fall far short of requirements. Because of this pressure for funding, the Indian Government was actively seeking offers of external financial aid. The only major commitment of foreign aid has been made with the Soviet Union. If outside funding is not available, implementation of some of the expansion programs could be delayed, possibly into the seventh plan period (1985-90).

Expansion projects have been underway at some of the major plants for several years. Progress in Bokaro steel plant's expansion to 4 million tons was almost 2 years behind schedule and was unlikely to be completed before 1984. Those sections of the $1.6 billion expansion completed during the year were the raw material handling yard, the No. 6 coke oven battery, and the third sintering line. The No. 7 coke oven battery, the 300-ton LD converter shop, and the No. 5 blast furnace were rescheduled for completion in early 1983. The second cold-rolling mill complex, expected to be commissioned in 1984, will complete the second-phase expansion at Bokaro.

Not part of the expansion, but a critical factor in the smooth operation of Bokaro, was the construction of a second captive powerplant consisting of three 60-megawatt generating units. The first unit of the $120 million project was scheduled for commissioning in September 1983. The second and third units would be completed at 4-month intervals thereafter.

The annual ingot capacity of the Bhilai steel plant was being expanded from 2.5 to 4 million tons at a revised cost estimate of $1.6 billion. The first unit of 30 megawatts of the second captive powerplant was commissioned during the year. The heavy-plate section of the plate mill was to be completed in February 1983. This will be the largest plate mill in India. The second unit of the powerplant is to be completed in March 1983. The remainder of the work won't be done before the end of 1984.

Visvesvaraya in Bhadravati, a public sector company owned 60% by the Karnataka State government and 40% by the Government of India, was expanding and modernizing its facilities from 77,000 to 118,000 tons per year of alloy and specialty steels. The project was generally on schedule, and the continuous caster was to be completed by March 1983. An oxygen plant, heat treatment plant, vacuum arc degassing unit, electroslag refining unit, and addi-

tional rolling equipment were scheduled for completion in 1984.

Planning was still underway for a large integrated public sector steel complex in the Daitari region of Orissa. The State government was requested to acquire 6,000 hectares of land for the plant and township. The original plan called for an export-oriented plant at the Port of Paradip. The project has been politically controversial and there was still a question of whether the plant will be started at all in the near future.

In the private sector, TISCO, India's oldest steel mill, was scheduled to complete its first phase of modernization and capacity expansion by March 1983. TISCO has imported British, West German, and Austrian equipment for this $277 million program, which will raise annual crude steel capacity by 10% to 2.2 million tons. The new $28 million oxygen plant was completed 2 months ahead of schedule. The remainder of the phase one construction consisted of a basic oxygen furnace plant with vacuum arc degassing and refining, a six-strand continuous billet caster, a new lime calcining facility, and new forging equipment.

Taking advantage of a liberal tax concession and reinvestment allowance permitted by the Government, TISCO has applied for approval of a $444 million phase two modernization program, which envisages construction of an additional sintering plant, billet caster, an additional captive thermal powerplant, and a bar and rod mill. By yearend, TISCO had received informal confirmation that its request would be granted. TISCO has completed an extensive development program at its captive coal mines in West Bokaro, including a new coal washer, which will give it near self-sufficiency in metallurgical coal requirements.

Lead and Zinc.—Hindustan Zinc Ltd. (HZL), the Government-owned lead and zinc company, showed a 23% increase in total sales over that of FY 1981. The sales increase, however, was offset by a low capacity utilization owing to the chronic electric power shortages. An increase in the price of imported concentrate, electric power, royalty, and other inputs adversely affected the company's profitability. The company expected to lose over $8 million in FY 1982 versus a small profit earned in FY 1981.

HZL has four major projects involving a $500 to $600 million outlay awaiting investment approval by the Government. The company was confident the projects would receive approval because of their technical quality and economic viability. The first was a captive powerplant with three 30-megawatt generators to be built at Chittaurgarh, about 110 kilometers east of Udaipur in Rajasthan. The plant will furnish reliable power to the Rajpura-Dariba Mine, the Rampura-Agucha Mine, and the planned Chittaurgarh smelter. The first unit could be completed 36 months after the company receives approval. In addition, there were plans to install a 15-megawatt, gas turbine-powered generator at the existing smelter at Debari. The turbine can be installed quickly and will be able to supply enough power to operate the plant on an emergency basis and prevent damage to equipment during the frequent unannounced power outages.

The large, high-grade zinc and lead deposit discovered at Rampura-Agucha will be the cornerstone of HZL's plans to eventually produce 60% of India's zinc needs and 70% of its lead needs. Plans call for an open pit mine for the first 20 years, then it would switch to underground workings. Exploration drilling is still continuing, and HZL is confident that the reserves will be higher than the currently published 52 million tons at 13.48% zinc and 1.93% lead. The mine could be commissioned 36 months after final approval and would cost an estimated $137 million. The project will be designed for mostly Indian-made equipment and have a very small foreign exchange component of $10 million. Mine production would initially be 2,400 tons of ore per day with expansion to 3,600 tons per day 2 years later. This should result in 70,000 tons of zinc in concentrate and 13,000 tons of lead in concentrate per year. The feasibility report for the mine and concentrator has been submitted to the Government for final decision.

HZL's third major project will be the country's largest zinc and lead smelter. Originally planned for the Bhilwara area near the Rampura-Agucha deposit, it will now be located at Chittaurgarh where water will be more readily available. The smelter would have a capacity of 70,000 tons of zinc metal and 35,000 tons of lead metal per year. Cost of the plant would be about $200 million. The smelter will use concentrate primarily from the Rampura-Agucha Mine and, in addition, some from the Rajpura-Dariba Mine.

Environmental considerations are becoming more important in the planning of

new projects. An acid plant at the smelter will convert sulfur dioxide waste gases into 600 tons of sulfuric acid per day.

The fourth plan awaiting investment approval was the Baroi Mine in the Zawar area of Rajasthan. This is a small deposit with demonstrated reserves of 4.1 million tons of ore at 3.85% lead and 1.22% zinc, with a further 2.9 million tons listed as possible reserves. Such a small deposit would not ordinarily be developed, but this deposit lies close to the existing mines at Zawar and the smelter at Debari. The mine would be designed for an output of 1,000 tons per day or approximately 8,800 tons of lead per year.

HZL currently has other projects in various stages of construction. The Rajpura-Dariba Mine, located between the Zawar Group and the Rampura-Agucha deposit, was essentially completed by yearend, and formal commissioning was expected in early 1983. Mine production will begin at less than 1,000 tons per day of ore, gradually increasing to 3,000 tons per day when fully developed in 1985. Concentrate will initially go to the Debari smelter.

Work on the Sargipalli Mine in Orissa continued during 1982. The major underground development work was completed by yearend. The 500-ton-per-day concentration plant was scheduled to be completed early in 1983. The project will yield over 10,000 tons of lead concentrate per year and a small amount of copper and silver.

In 1982, HZL completed the expansion of the mine workings at the Agnigundala lead mine in Bandalamottu, Andhra Pradesh. The mine can now produce 240 tons of ore per day. Doubling of the concentrator capacity to the equivalent output was completed in late 1981.

Cominco Binani Zinc Co. obtained permission from the Government to expand its zinc smelter near Cochin in Kerala in 1982. Capacity is to be increased from 15,000 to 20,000 tons per year at a cost of $20 million. The work will include modernizing the facilities and probably the replacement of the old roaster.

The company agreed to expand the smelter only when the Government agreed to reduce the customs duty on imported zinc concentrates from 50% to 15% earlier in the year.[9]

The $6 million project to expand the lead smelting capacity at Vishakhapatnam from 10,000 to 22,000 tons per year had been scheduled for completion in June 1983. Construction progress has slipped however, and the work may not be finished until early 1984.

The Government has also sanctioned the installation of equipment to remove mercury from the stack gases emanating from the roaster. The $2 million job will have technical assistance from a Norwegian firm and is scheduled for completion at yearend 1984.

Work on the slurry pipeline transport system from the Maton phosphate rock mine to the Debari smelter was expected to be completed in 1983. The phosphate rock will be used to make fertilizer at the Debari smelter's byproduct sulfuric acid and fertilizer plant.[10]

Magnesium.—The State-owned Tamil Nadu Industrial Development Corp. planned to set up India's first commercial magnesium metal plant, at Valinokkam in Ramanathapuram district. The plant would have a 600-ton-per-year capacity and be completed by mid-1985. The country's requirements were about 500 tons per year and were met wholly through imports.

The plant is to use technology developed by the electrochemical laboratory in Karaikudi. Process know-how has been licensed by the National Research Development Corp. The plant will use bittern from large saltwater evaporation ponds as its raw material.[11]

NONMETALS

Barite.—In an effort to reverse the downward trend in the export of barite, in May, the Government further liberalized its 1982-83 export trade policy with regard to barite used principally as a weighting agent in oil and gas well drilling operations. According to the trade control notice, export of Oilfield Chemicals and Materials Association and/or American Petroleum Institute (OCMA/API) grade barite lumps and powder is now allowed by all categories of exporters without any quantitative restrictions. The export was to be allowed by port licensing authorities' endorsement of shipping bills.

In addition, the new regulations no longer stipulated floor price restrictions for export of OCMA/API-grade barite powder formerly fixed at $64 per ton. However, a minimum floor price of $40 per ton continued to apply to OCMA/API-grade barite lumps earmarked for all destinations except west Asia where the price was $42 per ton.[12]

Research by the Indian Bureau of Mines on low-grade barite samples from the Man-

gampet deposit in Cuddapah district, Andhra Pradesh, indicated that a +94% barium sulfate ($BaSO_4$) concentrate with 3% silicon dioxide (SiO_2) could be obtained by a relatively simple flotation process. Specific gravity of the concentrate was 4.22, and particle size was 95% through 325 mesh. The collector coating on the concentrate was removable by acid treatment and the resulting concentrate met OCMA/API specifications.[13]

The low-grade barite overlies the high-grade ore at Mangampet and is presently removed as overburden. Commercial development of the flotation process could mean a substantial improvement in the overall mining economics of the Mangampet deposit.

Cement.—Production of cement fulfilled 93% of the country's consumption needs, the balance being provided through imports from other Asian countries. Installed capacity was reported to be about 32 million tons at yearend. The Government's recent policy of partial decontrol has stimulated growth in the industry and several new plants were under construction or on the drawing board.

India ranked 10th in the world in cement production even though most individual plants were operating at below capacity level. The major limiting factors continued to be shortages of coal, electric power, and timely rail transport.

The Government-owned Cement Corp. of India (CCI), which operated nine units and had three others under construction, was the major public sector cement manufacturer in India. CCI reported that with existing expansion plans the company would have an installed capacity of about 7 million tons per year by 1986. Its plans included expansion projects at the existing plants at Tandur, Nayagaon, and Yerrguntla, which will utilize modern technology, instrumentation, and controls including online X-ray analysis, computers for process control, and centralized control systems.

Other new cement manufacturing companies included the Indian Rayon Corp. Ltd., which announced plans for a 500,000-ton-per-year plant at Malkhed, Gubarga district, with the associated development of limestone quarrying operations nearby. The operation will be based on the dry-process technology using a 1,500-ton-per-year rotary kiln with precalciner.

Also planned for construction was a 500,000-ton-per-year plant at Mahua in Rhavnagar district. Originally planned for the Shbrkantha district, the new company will be named Ambuja Cements Pvt. Ltd.

Plans for smaller operations, about 50,000 to 70,000 tons per year each, were approved for at least six other locations in various States.

Also continuing was the development of a type of cement miniplant producing either 10 or 20 tons per day. The plants, some of which are to be exported, utilize a vertical kiln and produce cement that reportedly grades 60% to 70% stronger than the minimum stipulated in the Indian Standard Institute specifications. The inventor and manufacturer, D. P. Saboo, had firm orders for eight plants to be delivered by late 1983.

At yearend 1982, cement production levels provided materials for only the major construction projects and housing in urban areas. If India's economy is to continue to develop at a steady pace throughout the 1980's, an increase in housing construction in villages and small towns would have to be made possible, making ever greater demands on the cement industry. Extensive use of cement in the rural areas for roads, drainage systems, sewerages, grain storage, and tubewells was also forecast.

Fertilizer Materials.—Fertilizer production in India was one of the mineral-based industries that was under a variety of ownerships and managements. Of the more than 5 million tons of nitrogen production capacity in 1982, 58% was publicly owned and under the management of eight different companies. Fertilizer Corp. of India, National Fertilizers Ltd., and Hindustan Fertilizer Corp. Ltd. were the largest of the public sector companies. Ten privately owned companies controlled 32.5% of the installed capacity, and finally, the cooperative sector owned two large complexes, which accounted for 9.5% of capacity.

Production of phosphate fertilizer was similarly broken up but less strongly under Government control. Of the 1.4 million tons of phosphorus pentoxide (P_2O_5) production capacity, the public sector owned 46.4%; private sector, 35.4%; and cooperatives, 18.2%. The public and private sectors were each controlled by five companies, while the cooperative capacity was all under one complex, the large Kandla I and II plants.

Under this complex and varied ownership and management, there was a wide range of plant operating efficiencies. Capacity utilization of typical nitrogen fertilizer plants in FY 1981 ranged from 106% at the Kolol plant to 20% at the expensive new coal-

based Talcher plant. Overall, the average utilization was 61% in FY 1981, and preliminary estimates indicate an improvement to over 67% for FY 1982.

The low capacity utilization has led to substantial operating losses for public sector fertilizer companies as a whole. In the last 3 years, overall losses were $119 million in FY 1979, $215 million in FY 1980, and $111 million in FY 1981. In the last 4 years, only one public sector company has shown a consistent profit, Rashtriya Chemicals and Fertilizers Ltd. By contrast, the new plants at Talcher and Ramagundam, the largest coal-based fertilizer plants in the world, were not operating properly and incurred a combined loss of more than $66 million in FY 1981.[14]

Several factors account for the poor performance of the fertilizer industry; electric power shortages and instability, poor plant maintenance, raw material problems, and inadequate transportation facilities. The raw material and transportation problems of FY 1980 were greatly reduced in FY 1981 and early FY 1982. The main factor inhibiting the smooth operation of most of the plants continued to be the erratic and unpredictable supply of electric power. Another factor was frequent breakdowns of equipment, due in part to design deficiencies, in part to the poor maintenance of highly technical and complex equipment, and partly brought about by the voltage and frequency changes that play havoc with electric motors, pumps, and control equipment.

The increasing demand for fertilizer in India dictates a continuing program of new construction. A number of new projects were underway and more were planned. The emphasis in new construction will be gas-based nitrogen plants using the offshore resources of the Bombay High Oilfield and South Bassein Gasfield.

Preliminary site-preparation work began on a diammonium phosphate (DAP) plant at Kakinada in Andhra Pradesh. Godavari Fertilizers and Chemicals Co. will manage the project, scheduled to go onstream by January 1986. The 315,000-ton-per-year plant will be jointly owned by the government of Andhra Pradesh and the Indian Farmers Fertilizers Cooperative Ltd. The project will cost about $83 million and employ over 750 persons directly. Indirect employment in the area would be several thousand more.[15]

Mangalore Chemicals and Fertilizer Co. planned to build a 150,000-ton-per-year DAP-nitrogen-phosphorus-potassium plant in Mangalore. Contract negotiations were reportedly underway with Toyo Engineering Co. of Japan. The plant will cost about $28 million and use imported liquid ammonia.

Site locations were finally announced for five of six long-planned, natural gas-based nitrogen fertilizer plants. The plants, which were proposed in 1980 but identified by State only, will use the natural gas from the offshore Bassein Gasfield. These will be in addition to the large plants already under construction at Thal-Vaishet and Hajira.

Four plants will be located in Uttar Pradesh, at Badrala, Badaun district; Aonla, Bareilly district; Shahjahanpur, Shahjahanpur district, and Jagdishpur, Sultanpur district. The fifth plant will be in Madhya Pradesh at Bijayapur, Guna district. The location of the sixth plant, planned for Rajasthan, has yet to be announced. The locations were chosen in major fertilizer-consuming regions to minimize transportation bottlenecks and cost.

The Government has reportedly decided to award the right to build and own Bijayapur plant to National Fertilizers. Construction on this, the first of the series, was expected to begin in April 1984.

Bijayapur, and each of the other plants, will be designed to produce 1,350 tons per day of ammonia to be converted into 2,200 tons per day of urea. Each plant was estimated to cost $500 to $600 million. The Government expects the Indian companies that are awarded the plants to finance as much as possible from their own resources. The foreign exchange components will be between 35% and 40% of the total cost. The International Bank for Reconstruction and Development (World Bank) may be asked for assistance in the foreign exchange part of the financing.[16]

A major disappointment to the Indian Government has been the performance of the Talcher and Ramagundam fertilizer plants. These were to be the forerunners of a series of fertilizer plants that would use cheap, high-ash Indian coal to make nitrogenous fertilizer. The capital cost of the plants was at least 1.75 times a conventional gas- or naphtha-based plant, but this was considered to be offset by the much lower long-term raw materials costs.

In 2 1/2 years of production, however, the plants have turned out to be operational and technical nightmares. The ash content

of the coal feed has been a critical factor at the Talcher plant. Designed to handle up to 22% ash, the plant has been supplied with coal averaging 35% ash and a high silica content as well. This has resulted in high rates of wear in the coal preparation equipment and serious clogging problems in the coal gasification section. In addition, the extra ash content has increased the coal to ammonia output ratio from 3 tons of coal per ton of ammonia to as high as 4.5 tons per ton of output.

Unsatisfactory feedstock was only one of several persistent serious problems. Leakage in the coal gasifier unit and in the waste heat boiler have been a constant source of shutdowns. One-half of the breakdowns at Ramagundam were related to the waste heat boiler. Metal chain-type ash extractors in the gasifiers experienced corrosion and erosion and ultimately shattered. The parts were being modified and replaced. Problems in the air separation plant have been so persistent that the entire unit will probably be replaced by redesigned plate-type aluminum regenerators.

Two Government studies have recommended an investment in new equipment at the plants, which would cost about $130 million each, an amount equal to about one-half the original investment.

Plans had been well along for the construction of a third coal-based plant, to be located at Korba in Madhya Pradesh. However, in light of the present problems, it was apparent that this third plant was not likely to be built in the present decade.[17]

Completion of the large Hajira fertilizer complex in Gujarat will reportedly be delayed because of the unexpected presence of hydrogen sulfide gas in its potential natural gas feedstock source. The gas from the South Bassein Gasfield, which is under development, was originally thought to be free of hydrogen sulfide, which is highly corrosive. The presence of the gas will cause delays while scrubbing equipment is designed and built for the offshore gasfield platforms. The other potential customers for the South Bassein gas may also be affected by this development.

India produced no potassium fertilizer from domestic raw materials, but has been exploring in geologically promising areas and researching unconventional sources of potassium that might be commercially exploited. The most promising to date is a process for recovering potassium from the waste obtained in sea-salt evaporation plants.

The Central Salt and Marine Chemicals Research Institute has developed a process to use bittern, the liquid remaining after evaporation of seawater during the production of salt. The mineral schoenite, a double salt of potassium and magnesium sulfate, would be obtained by further solar evaporation of the bittern. It was reported that for each 100,000 tons of sea-salt production, 81 acres of additional evaporation pans would be necessary to recover the schoenite. The Institute estimated that the bittern produced by the large saltworks in Gujarat and Tamil Nadu could be profitably utilized and save up to $2.4 million in foreign exchange each year. A pilot plant using the process was in operation. The Gujarat State government intends to employ the process at plants planned for Jamnagar, Bhavnagar, Kandla, and Kuda. The four plants would recover a total of 11,000 tons of schoenite per year.[18]

Another potential source of potassium was the subsoil brine in the Rann of Kutch, a natural saltpan in Gujarat. This brine contains 1.5 times more potassium than sea brines, averaging 2.17% potassium chloride. Solar evaporation of this brine under controlled conditions could yield a 17% to 19% potassium concentrate.

GSI continued its exploration for potash deposits in the Nagaur Basin of western Rajasthan State and in the adjoining parts of Haryana State. The earlier reconnaissance survey of the area delineated extensive halite beds and areas to be examined in more detail. A limited area of 13,000 square kilometers was under intensive investigation during 1982.

Magnesite.—The Government-owned Tamil Nadu Magnesite Ltd. reportedly was to invest $100 million in a major expansion program at its Salem district deposit, believed to be the best in the country. A $25 million beneficiation plant will provide high-quality feed to a rotary kiln and refractory brick unit, which will account for the remainder of the investment. The estimated reserves of 8 million tons were being extracted at a rate of about 10,000 tons per month, most of which was sold as raw magnesite to industrial users.[19]

At the other end of the country, a large magnesite deposit was reported in Chamoli district of northern Uttar Pradesh. The deposit was being examined to work out its commercial viability.

Salt.—The Gujarat Industrial Investment

Corp. has reportedly awarded design and construction contracts for a 200,000-ton-per-year soda ash plant to be built at Saurashtra on the south coast of Gujarat. Gujarat is the major salt-producing State in India, normally producing 3 million to 4 million tons per year, or more than one-half of India's total supply. Limestone is also available locally. The $93 million plant will have a built-in expansion capability to 375,000 tons per year. Construction was to begin as soon as Government permission was granted.

Talc.—A preliminary geological appraisal has been made of the Dagota Jharna soapstone mines in Jaipur district of Rajasthan. The mines have been worked haphazardly, both as open pit and underground workings, for more than 50 years, but no systematic study of the geology or estimate of reserves had been made. Production in recent years has been about 60 tons per day.

The study indicated that the deposit may be the biggest of its kind in India, with a reserve potential of 5.6 million tons of good-quality soapstone. Measured reserves were put at 1.32 million tons, more than three times the previous Indian total. The study strongly recommended exploratory drilling of the deposit to delineate the known ore bodies, discover any additional ore bodies, and develop a systematic mining plan for the efficient and economical exploitation of the entire deposit.[20]

Wollastonite.—A high-grade deposit of wollastonite was discovered near Totaladoh in the Nagpur district of Maharashtra. This was the first reported occurrence of the calcium silicate mineral in Maharashtra. The deposit reportedly graded over 45% calcium oxide content and was considered to be commercially exploitable.

Indian Bureau of Mines geologists have reported the discovery of another, similarly attractive deposit, in the Tirunelveli district of Tamil Nadu.

The mineral, used in ceramics, paint, rubber, plastics, and electric insulators, was currently produced only in the State of Rajasthan.[21]

MINERAL FUELS

Coal.—The increase in Indian coal output slowed after 2 years of large gains to only 4%. Although still a substantial gain, the production was short of the FY 1982 plan of 135 million tons or even the revised plan of 133 million tons. The plan for FY 1983 showed a modest increase to 142 million tons. To meet the increased production goal and projected demand, the Planning Commission and Ministry of Finance have approved an investment of $894 million for FY 1983. Demand for 1982 and 1983 was projected at slightly higher than production, but there was more than 20 million tons of pithead stocks available to cover any production shortage.

The relative proportion of coal produced in the open pit mines has been increasing steadily for several years and was expected to rise to about 60% from its current level of about 45%. With the increase in open pit coal production, the average output per worker shift (OWS) of the coal miners has also increased. As mechanization in the open pits increased, the OWS has gone from 1.06 tons per shift in 1977 to 1.83 tons per shift by March 1982. During the same period, OWS in the underground mines has declined from 0.61 to 0.55 ton per shift.

India was putting a high priority on the continuing development of its coal industry. This includes both immediate development projects and a long-term exploration program to add to and upgrade the known coal reserves. Counting only coal seams 1.2 meters and above in thickness and down to a depth of 600 meters, the GSI reported reserves at 86 billion tons. However, as mining techniques improve, it has been decided that less stringent cutoffs could be considered for planning purposes. If seams 0.5-meter-thick and above and down to a depth of 1,200 meters are considered, the reserves increase to 112 billion tons.

In the continuing process of coal exploration and utilization of new coal deposits, GSI was responsible for regional drilling and preparation of geological reports. On the basis of these reports, potential blocks are demarcated, and detailed exploration is taken up by the Central Mine Planning and Design Institute Ltd. in conjunction with MEC, keeping in view the regional demand for coal for the forthcoming plan periods. As currently operated, the program provides a lead time of about 10 years for the mines to go into production.

To continue development of coal production through the coming years, 15 coal mines having a combined production capacity of 21.8 million tons per year at a capital outlay of $1.1 billion have been sanctioned by the Government during the year. The planned mines run in size from 420,000 tons per year for an underground expansion of Shrirampur Mine under Singareni Col-

lieries Co. Ltd. to 4 million tons per year for the Amolori open pit mine under Central Coalfields Ltd.

One of the major coal development projects underway was the expansion of the Singrauli coal mines and the simultaneous building of the nation's first pithead superthermal powerplant (STPP). Several other pithead STPPs are under construction in various Indian coalfields, but Singrauli was the first to be started. The first 200-megawatt unit was commissioned during the year.

The first phase of the Singrauli STPP consists of three 200-megawatt turbogenerators, the country's first computer-controlled system, the development of the coal mine, construction of the extensive infrastructure, and the start of a 400-kilovolt transmission system. The second phase will add two more 200-megawatt turbogenerators and additional mine and transmission line development. The third stage will consist of two 500-megawatt turbogenerators, the largest such units in India, and the completion of more than 1,200 kilometers of 400-kilovolt transmission lines.

The coal for the project will be supplied from the Jayant block of the Singrauli Coalfield. The Jayant block has minable reserves of 337 million tons and was being developed for a capacity of 10 million tons per year. The staged development of the mine to 6 million tons was underway at a cost of $80 million.

The planned production stages begin at 1.6 million tons per year in 1983. When the plant is fully operational at a baseload of 7,000 hours per year, the coal requirement will stabilize at 8.26 million tons per year.

The coal will be transported to the power complex by a captive unit train system, which was already established as a part of the first-phase operation.

At least nine other STPPs have been planned, three of which are well along in construction. All of these plants are to be located at the coal mines or as close as economically possible. Each will be over 1,000 megawatts in capacity, and each will require the staged development of huge captive coal mines similar to the Singrauli project. Cost of each of these projects will be over $1 billion, and the ultimate coal consumption of the plants under baseload operation will be more than 40 million tons per year.

Several problems plagued the industry during the year. Labor unrest has caused the loss of considerable production and lost worktime. More than 0.5 million workdays were lost in 381 strikes during FY 1982, and over one-half of the lost workdays were in the Eastern Coalfields Ltd. mines. There was little improvement in the situation, and 429,000 workdays had been lost through December with 3 months of the fiscal year remaining.

Unauthorized absences by the coal miners, other than formal strikes, have been a problem resulting in loss of over 2 million tons of coal production. Conditions improved and the loss had dropped to about 1.75 million tons.

The problem of outright theft of coal has become serious, especially at Eastern Coalfields mines. It was estimated that nearly 2 million tons of coal was pilfered from colliery sidings, depots, and railway yards.

The electric power shortage hits the coal mines possibly more than other industries. Unexpected power cuts in the underground mines cause an immediate evacuation of the workings because of the loss of ventilation and pumping capacity. The delay in returning the workings to production can be extended as the accumulated gases take time to remove after the power is restored. If the power cut has been extended, pumping out the accumulated water can take added days before miners can return to the lower working levels.

Captive powerplants were being installed in several of the major mines. As a short-term expedient, permission to install gas turbine-generator sets was granted in some cases. Two sets of 10 megawatts each were installed in selected Bharat Coking Coal Ltd. mines and two sets of 5 megawatts each at Eastern Coalfields mines.

In summary, at yearend, there were 99 coal mines under construction having a development cost of more than $5 million each with an aggregate investment of $2.42 billion and a final capacity at maturity of 149 million tons per year. In addition, the Moonidih coal washery of Bharat Coking Coal was commissioned, and four other washers were under construction.

Petroleum and Natural Gas.—Indian petroleum production was increasing and will continue to increase rapidly in the next 2 to 3 years as output from the Bombay High offshore fields begins to approach its maximum sustainable level of 150 million barrels per year. Offshore production has gone from 25 million barrels in FY 1978 to over 92.7 million barrels in FY 1982 and a

projected 125 million in FY 1983. Proportionately, the offshore component of India's crude production has gone from less than one-half to about double the onshore output during the same period.

Consumption, which hit about 260 million barrels in 1982, continued to increase as industry, agriculture, and the population growth called for more energy use. The increase, however, has been less than the corresponding production growth, allowing a gradual decrease in both volume and value of petroleum imports. The value of petroleum imports dropped from $5.3 billion in FY 1980 to $4.6 billion in FY 1982 and a further decrease was expected for FY 1983.[22]

Although the short-term situation looks good, the medium term begins to darken somewhat because India's exploration efforts of the last several years have not produced commercial amounts of oil. The recent and projected increase in production has come from Bombay High and its satellite fields. There have been finds in other sedimentary basins, but amounts were not of sufficient size, and subsequent assessment wells have been disappointing. This was true also of the Krishna-Godavari Basin, where hopes had been very high. The possibility of a major field being discovered was still high because there were so many structures that have not yet been properly explored.

The Oil and Natural Gas Commission (ONGC), the major Government-owned oil company, was continuing its vigorous and expensive exploration program, which called for an expenditure of over $6.4 billion in materials and services alone through the end of the 1980's. More than $275 million was to be spent in 1983.

ONGC had 12 rigs operating offshore and on order. In addition, it has extended numerous tenders for additional drill ships and rigs. Also, following a well blowout that destroyed a production platform and India's own drill rig Sagar Vikas in July, ONGC called for bids for a replacement rig.

India's second oil company, Oil India Ltd. (OIL), was conducting its first offshore exploration in the Mahandi Basin 20 kilometers off the coast of Orissa. The 2-year project called for six wells to be drilled by a chartered jack-up rig in shallow water and good seabed conditions. Offshore seismic work in the basin was completed but still underway in the onshore delta area where hydrocarbon prospects were mainly gas.

Hydrocarbon prospects in Mahandi Basin were less promising than Krishna-Godavari's, but the shallow water conditions mean that a discovery doesn't have to be nearly as large to be commercial.

Chevron Oil Co. signed the only oil production-sharing contract between India and a foreign oil company in March. The agreement called for Chevron to drill five wells in a 5-year period and a minimum investment of over $45 million. If no hydrocarbons are discovered in the 18,500-square-kilometer concession block, it reverts to the Government of India. Chevron would share in any profit oil, but until India becomes independent of foreign oil imports; all such oil must be sold to India. During the year, Chevron logged approximately 5,000 kilometers of seismic surveys in its block.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, Indian rupee (Rs) values have been converted to U.S. dollars at the rate of Rs7.90=US$1.00 for 1980, Rs9.00=US$1.00 for 1981, and Rs9.65=US$1.00 for 1982.

[3]The Indian fiscal year begins Apr. 1 of the year stated.

[4]U.S. Embassy, New Delhi, India. State Department Telegram, New Delhi 08773, dated R020710Z May 1983, p. 1.

[5]Metal Bulletin (London). No. 6727, Oct. 5, 1982, p. 17.

[6]Minerals and Metals Review (Bombay, India). V. 8, No. 11, November 1982, p. 12.

[7]Ministry of Steel and Mines, Government of India, New Delhi. Department of Mines Report 1982-83, p. 97.

[8]Iron and Steel Review (Calcutta, India). V. 26, No. 10, March 1983, p. 11.

[9]Metal Bulletin (London). No. 6722, Sept. 17, 1982, p. 15.

[10]Page 90 of work cited in footnote 6.

[11]Minerals and Metals Review (Bombay, India). V. 9, No. 5, May 1983, p. 32.

[12]U.S. Embassy, New Delhi, India. State Department Telegram, New Delhi 087744, dated RO51237Z May 1982, p. 1.

[13]Minerals and Metals Review (Bombay, India). V. 8, No. 9, September 1982.

[14]Chemical Industry News (India). V. 27, No. 8, December 1982, p. 630.

[15]———. V. 27, No. 6, October 1982, p. 450.

[16]U.S. Embassy, New Delhi, India. State Department Telegram, New Delhi 20845, dated R211112Z October 1982, p. 1.

[17]———. State Department Telegram, New Delhi 18343, dated R220546Z September 1982, p. 1.

[18]Phosphorus and Potassium. No. 124, March-April 1983, p. 43.

[19]World Mining. V. 35, No. 11, November 1982, p. 63.

[20]Indian Mining & Engineering Journal. V. 21, No. 9, September 1982, pp. 5-12.

[21]———. V. 21, No. 8, August 1982, p. 15.

[22]U.S. Embassy, New Delhi, India. State Department Telegram, New Delhi 07089, dated R080947Z April 1983, p. 1.

The Mineral Industry of Indonesia

By John C. Wu[1]

Indonesia's real gross domestic product, which measures the country's overall performance of the economy, grew only 3% in 1982 compared with 7.6% (revised) in 1981.[2] A cutback in Government spending; the slowdown in domestic demand because of recession; a substantial drop in output of crude oil because of the implementation of production ceilings imposed by the Organization of Petroleum Exporting Countries (OPEC); a continuous decline in timber and rubber owing to export restrictions; and a smaller increase in agricultural production were cited as the main causes of the slowdown in the Indonesian economy.

The effect of the deepening recession and the soft international oil market on Indonesia's balance of payments, which reflects the balance of ongoing transactions, foreign assistance, and the payment of debt during the year, was severe in 1982. As a result of a sharp drop in export earnings (especially from oil and gas) and a continued high level of imports, Indonesia's current-account deficit increased to $6.8 billion from $2.3 billion in 1981.

According to an annual report on the Indonesian economy prepared by the International Bank for Reconstruction and Development (World Bank),[3] the current-account deficit was equivalent to 8% of Indonesia's gross national product (GNP), which was estimated at $85 billion[4] for 1982. The annual report stressed that to narrow the deficit, the Government of Indonesia must cut back its major industrial projects and borrow $16 billion more from abroad over the next 3 years for payment of interest and service charges on its debt. At the end of the 1982-83 fiscal year (ending March 1983), the total public debt was $20 billion. In addition, an overhaul of Indonesia's tax and trade system and investment incentives were recommended by the World Bank for Indonesia to sustain a more healthy deficit level of 2% of GNP.

Despite the adverse conditions, Indonesia's capability to produce oil and gas was increasing. In 1982, two new oilfields in Riau Province were put into production by P.T. Caltex Pacific Indonesia (CPI). A new crude oil processing facility was brought into operation offshore the Krisna Oilfields by Natomas Co. Several large oilfields were discovered on and offshore Sumatra. Exploration drilling set another record of 284 wells, and 13 more production-sharing contracts were signed between Indonesia and foreign companies. Production capacity of coal was also expanding at the Ombilin and Bukit Asam Mines.

In February, Indonesia's first aluminum smelter came onstream in northern Sumatra. The second phase of the Krakatau Steel project was almost completed by yearend. However, the nickel project of P.T. Pacific Nickel Indonesia (P.T. Inco) on Gag Island was terminated owing to the unfavorable prospects of the world nickel market. Despite the soft international markets for copper and tin, the output of the two metals remained at the 1981 level. In August 1982, a contract was awarded to a West German-Japanese consortium to build the country's first tin-plating plant in West Java.

Indonesia's cement industry continued to grow in 1982. The industry clinker capacity was expected to reach 9.8 million tons per year in 1983. In April, a contract was awarded to a Japanese firm to construct a 1.2-million-ton-per-year capacity cement plant in West Java.

The expansion project of P.T. Petrokimia Gresik to produce superphosphoric acid at Gresik in East Java was almost completed. An ammonia-urea plant was brought into operation by P.T. Pupuk Kalimantan Timur near Bontang in East Kalimantan. Construction of two more ammonia-urea fertilizer plants were well underway in Aceh of North Sumatra and in Bontang of East Kalimantan.

Export earnings of oil and gas continued to contribute 80% of the country's income from exports of goods followed by tin, 2%; other minerals including copper, nickel, bauxite, and other nonmetallic minerals, 2%; coffee, 2%; rubber, 4%; forestry products, 5%; and other, 5%. In fiscal year 1982, export earnings were estimated at $19.1 billion while import bills were estimated at $20.3 billion.

In January, Indonesia began implementing a counter-purchase policy that requires foreign companies to import the same value of Indonesian goods when they export plant machinery, equipment, or materials to Indonesia. By late 1982, several contracts, valued at more than $250 million, reportedly were concluded under this policy between Indonesia and foreign companies from Japan, Singapore, the United States, the Federal Republic of Germany, the German Democratic Republic, Romania, and the Republic of Korea.

PRODUCTION

Despite the worldwide economic recession, most of the mineral production in Indonesia either remained at the same level or increased slightly from that of 1981 except crude oil and bauxite. A significant reduction of bauxite production was due to a substantial cutback of exports to Japan. A 19% drop in the output of crude oil was due to observing the production ceiling imposed by OPEC. The crude oil production of CPI was affected mostly by this production curtailment. However, crude oil production capacity was augmented by operations of two new oilfields in Riau and a new crude processing platform offshore in the Java Sea.

Indonesia began its first aluminum production in February. Because of the soft world market, the first year output fell short of the 50,000 tons planned for 1982. However, production of copper, gold, silver, and iron sand increased slightly while nickel and tin production remained at the same level as that of 1981.

In the nonmetallic sector, the output of cement and fertilizer continued their strong upward trend. Increased construction and the Government policy of self-sufficiency in agricultural production were two major driving forces for the expansions.

In the mineral fuels sector, coal production rose to 480,000 tons. The output of coal from the Ombilin Mine increased by 25% to 300,000 tons, while the Bukit Asam Mine produced 180,000 tons. Although crude oil production was being curtailed at the level of 1.3 million barrels per day in 1982, Indonesia continued to produce 1.1 trillion cubic meters of natural gas and produced about 475 billion cubic feet of liquefied natural gas (LNG).

Table 1.—Indonesia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite, dry equivalent, gross weight thousand tons	1,008	1,052	1,249	1,203	770
Metal, primary	--	--	--	--	30,000
Copper, mine output, metal content	[r]58,947	[r]60,198	59,027	62,516	73,100
Gold metal[2] troy ounces	[r]64,589	[r]61,278	58,383	54,240	54,400
Iron and steel:					
Iron sand, dry basis	233,341	79,877	62,914	86,626	147,000
Metal:					
Ferroalloys, ferronickel	19,734	17,878	18,314	19,884	20,000
Steel, crude	[r]225,000	[r]305,000	360,000	500,000	600,000
Manganese ore	5,889	5,909	4,299	2,587	4,000
Nickel:					
Mine output, metal content[3]	31,414	[r]38,195	38,436	38,830	40,800
Metallurgical products:					
Matte:					
Gross weight	[r]5,729	[r]8,597	20,532	19,940	10,000
Nickel content	[r]4,411	6,715	15,810	15,300	7,700
Ferronickel:					
Gross weight	[r]19,734	17,878	18,314	19,884	20,000
Nickel content	[r]4,418	4,000	4,421	4,703	4,730
Silver, mine output, metal content thousand troy ounces	[r]825	[r]793	701	830	867
Tin:					
Mine output, metal content	27,411	29,535	32,527	35,394	34,900
Metal	25,829	27,790	30,465	32,519	32,000
NONMETALS					
Asbestos[e]	--	--	--	5,000	5,000
Cement, hydraulic thousand tons	3,694	4,698	5,821	6,844	7,200
Clays, kaolin powder	37,400	58,539	75,558	80,904	81,000
Diamond:[e]					
Industrial thousand carats	12	12	12	12	12
Gem do.	3	3	3	3	3
Total do.	15	15	15	15	15
Iodine kilograms	7,253	25,287	29,306	25,360	25,000
Nitrogen: N content of ammonia	[r]1,095,888	[r]623,207	938,455	920,213	1,020,000
Phosphate rock	6,071	5,323	11,191	6,596	12,000
Salt, all types thousand tons	235	706	690	286	700
Stone:					
Granite do.	495	678	926	1,811	2,000
Limestone[4] do.	4,699	6,107	7,605	8,749	9,000
Marble square meters	33,496	25,216	25,380	28,842	30,000
Quartz	307,480	127,082	260,075	155,730	150,000
Sulfur, elemental[5]	204	180	197	951	900
MINERAL FUELS AND RELATED MATERIALS					
Asphalt rock, bitumen content	162,000	[r]91,000	173,018	276,498	280,000
Coal thousand tons	264	279	304	350	480
Gas, natural:					
Gross million cubic feet	643,148	998,457	1,045,748	1,123,720	1,111,928
Marketed do.	384,116	398,807	695,914	720,258	750,000
Natural gas liquids: Propane and butane[e] thousand 42-gallon barrels	11	15	15	15	14
Petroleum and refinery products:					
Crude, including field condensate do.	596,698	580,447	577,016	584,838	488,167
Refinery products:					
Gasoline do.	15,363	15,405	17,475	17,015	13,385
Jet fuel do.	--	59	25	--	8
Kerosine do.	19,187	24,217	25,988	24,052	18,947
Distillate fuel oil do.	18,345	18,735	19,184	17,850	14,714
Residual fuel oil do.	16,128	14,683	17,985	14,343	14,131
Lubricants do.	264	544	499	--	525
Liquefied petroleum gas do.	373	72	294	448	373
Paraffin wax do.	62	338	253	143	103
Naphtha do.	1	1	(6)	(6)	465
Unfinished oils requiring further processing do.	28,795	40,096	41,599	39,188	26,355
Unspecified do.	1,420	3,172	2,418	1,962	5,623
Refinery fuel and losses do.	2,887	3,159	3,917	3,443	4,654
Total do.	102,825	120,481	129,637	118,444	99,283

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through July 14, 1983.

[2]Includes Au content of copper ore and output by Government-controlled operations. Gold output by operators of so-called People's mines is not available but may be as much as 30,000 troy ounces per year.

[3]Includes a small amount of cobalt that is not recovered separately.

[4]Data represent limestone used for cement production. Excludes considerable amounts of limestone produced by enterprises under local jurisdictions for building materials, for crushed rock to be used as aggregate, and to burn for lime.

[5]Sulfur produced by other than the Frasch process.

[6]Less than 1/2 unit.

TRADE

Indonesia experienced a significant reduction in its merchandise trade balance because of the continued worldwide economic recession and the glutted international oil market. Exports of oil and nonfuel commodities fell by 15% to $19.8 billion, while imports rose by 19% to $15.9 billion in 1982. As a result, the trade surplus decreased to $3.9 billion in 1982 from $9.9 billion in 1981.

According to a preliminary report of the Central Bank of Indonesia, export earnings of crude oil dropped 19% to $13.5 billion, but exports of LNG rose 6% to $2.4 billion. Furthermore, exports of commodities also fell by 10% to $3.9 billion in 1982. The decline in export earnings of nonfuel commodities was attributed mostly to the continued reduction in exports of timber and rubber owing to export restriction policies. Exports of tin also fell by 19% to $370 million. However, imports rose by 19% to $15.9 billion. The continued high level of imports for machinery, electrical equipment, transportation equipment, and base metals was attributed mainly to the expansion of coal mines and construction of several major industrial projects in Indonesia.

Japan, the United States, and Singapore remained the major trade partners of Indonesia. Based on the value of two-way trade, Japan accounted for 40% of the total merchandise trade followed by the United States, 16.5%; Singapore, 14.6%; and others, 28.9%.

Table 2.—Indonesia: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	1,113	956	--	All to Japan.
Metal including alloys, all forms	582	910	--	Singapore 615; Japan 295.
Chromium: Ore and concentrate	2,750	--		
Copper:				
Ore and concentrate	193,509	197,146	--	Japan 133,690; West Germany 25,593; U.S.S.R. 19,244.
Metal including alloys, all forms	766	296	--	Singapore 151; Thailand 145.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	9,462	2,400	--	NA.
Metal:				
Scrap	849	--		
Pig iron, cast iron, related materials	92,574	82,045	--	India 68,229; Japan 4,954.
Steel, primary forms	--	1	--	All to Singapore.
Semimanufactures:				
Bars, rods, angles, shapes, sections	23,154	24,859	--	India 22,357.
Universals, plates, sheets	223	8	--	Malaysia 6.
Wire	7	58	--	All to Singapore.
Tubes, pipes, fittings	817	1,050	--	Singapore 1,011.
Castings and forgings, rough	14	17	--	Japan 9; Singapore 8.
Lead:				
Ore and concentrate	--	2,435	--	Japan 1,497; Malaysia 539; United Kingdom 399.
Metal including alloys, all forms	--	181	--	Japan 164.
Manganese: Ore and concentrate	9,574	30,062	--	Japan 24,320.
Nickel:				
Ore and concentrate	883,055	842,045	--	Japan 823,947; Switzerland 18,098.
Matte and speiss	42,763	44,947	2,554	Japan 31,540; Netherlands 5,789; United Kingdom 5,064.
Metal including alloys, unwrought	--	221	--	All to Japan.
Tin:				
Ore and concentrate	4,857	1,044	--	Malaysia 574; Singapore 300; United Kingdom 170.
Metal including alloys:				
Scrap	1,404	750	--	Netherlands 450; Singapore 300.
Unwrought	26,169	32,128	--	Singapore 12,169; Netherlands 8,640; Japan 6,350.
Zinc: Metal including alloys, all forms	--	80	--	All to Singapore.
Other: Ashes and residues	1,675	1,667	--	Japan 1,302; Singapore 350.

See footnotes at end of table.

Table 2.—Indonesia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	9	11	--	All to Hong Kong.
Grinding and polishing wheels and stones	--	6	--	Do.
Barite and witherite	6,451	10,644	--	Singapore 9,284; Philippines 1,360.
Cement	495,203	453,961	--	Bangladesh 190,629; India 117,500; Singapore 98,549.
Chalk	603	383	--	All to Singapore.
Clays and clay products:				
Crude:				
Bentonite	2,946	4,932	--	Singapore 4,705.
Kaolin	5,313	9,310	--	Taiwan 5,818; Philippines 3,150.
Unspecified	--	2	--	All to Italy.
Products, nonrefractory	--	1,488	--	All to Singapore.
Fertilizer materials: Manufactured:				
Ammonia	6,043	22,556	--	Philippines 16,968; Malaysia 3,395.
Nitrogenous	230,526	16,781	--	All to Philippines.
Halogens: Iodine	29	10	--	Mainly to France.
Phosphates, crude	518	300	--	All to Taiwan.
Pigments, mineral: Iron oxides and hydroxides, processed	--	7	--	All to West Germany.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	523,253	935,717	--	Singapore 889,898; Malaysia 44,459.
Gravel and crushed rock	220	45	--	Mainly to Singapore.
Limestone other than dimension	66	260	--	Singapore 250.
Quartz and quartzite	--	801	--	All to Singapore.
Sand other than metal-bearing thousand tons	2,979	4,263	--	Do.
Sulfur:				
Elemental, colloidal, precipitated, sublimed kilograms	155	270	--	Singapore 160; Malaysia 110.
Sulfuric acid	--	26	20	Denmark 3.
Other:				
Oxides and hydroxides of barium, magnesium, strontium	77	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	4,511	--	Sri Lanka 3,826.
MINERAL FUELS AND RELATED MATERIALS				
Coal, all grades including briquets	112,487	156,695	--	Malaysia 73,889; Japan 44,352; Thailand 20,668.
Gas, natural[1] million cubic feet	449,011	459,670	--	All to Japan.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	378,479	373,165	82,591	Japan 167,842; Singapore 31,814; Trinidad and Tobago 25,615.
Refinery products:				
Liquefied petroleum gas[1] do.	18,474	20,602	8,520	New Zealand 7,661; Singapore 2,645.
Gasoline, motor do.	8	--		
Mineral jelly and wax do.	93	20	--	Singapore 14; Hong Kong 6.
Kerosine and jet fuel do.	29	47	--	NA.
Distillate fuel oil do.	23	19	--	NA.
Lubricants do.	(2)	33	--	NA.
Residual fuel oil do.	39,570	37,278	10,475	Japan 22,614; Republic of Korea 2,699.
Tars and other crude chemicals derived from coal, gas, and petroleum	6,984	--		

NA Not available.

[1]Data revised to distinguish between liquefied natural gas (LNG) and liquefied petroleum gas (LPG) which are not separated in the official source publication. Data on LNG obtained from Japanese imports statistics have been subtracted from total Indonesian exports of LPG and LNG.

[2]Less than 1/2 unit.

Table 3.—Indonesia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals, unspecified	20	31	--	Japan 11; China 10; Singapore 7.
Aluminum:				
Ore and concentrate	929	50	--	All from China.
Oxides and hydroxides	19,316	39,859	60	Australia 19,873; China 3,950; West Germany 2,420.
Metal including alloys:				
Scrap	339	60	--	All from Japan.
Unwrought	14,131	21,161	2,766	Canada 3,619; China 3,302; Australia 2,396.
Semimanufactures	19,918	25,168	1,293	Japan 5,299; Belgium-Luxembourg 1,892; Romania 1,466.
Chromium:				
Ore and concentrate	11	147	--	Philippines 144.
Oxides and hydroxides	107	416	110	Norway 63; West Germany 58; Italy 54.
Cobalt: Oxides and hydroxides	5	17	1	West Germany 10.
Copper:				
Matte and speiss including cement copper	--	50	1	Japan 49.
Sulfate	409	394	(1)	Japan 174; Italy 172.
Metal including alloys, all forms	22,640	25,725	370	Japan 15,278; Tanzania 3,502; Zambia 2,501.
Gold: Metal including alloys, unwrought and partly wrought, troy ounces	r4,719	716,211	--	United Kingdom 683,464; Switzerland 12,539; Netherlands 9,645.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	285,046	701,574	--	Sweden 369,412; Brazil 332,162.
Pyrite, roasted	NA	112,650	--	Sweden 57,914; Brazil 54,736.
Metal:				
Scrap	39,009	62,693	--	Australia 21,981; China 7,660; Japan 6,681.
Pig iron, cast iron, related materials	34,963	74,897	139	Republic of Korea 38,909; China 15,238; Australia 10,952.
Ferroalloys:				
Ferromanganese	3,142	2,744	--	Australia 1,506; China 170.
Unspecified	12,303	3,487	68	China 1,324; Australia 688.
Steel, primary forms	r470,993	498,986	36	West Germany 99,377; Republic of Korea 55,428; Mozambique 35,584.
Semimanufactures:				
Bars, rods, angles, shapes, sections	241,186	227,934	1,985	Japan 199,440; Republic of Korea 5,875; West Germany 3,057.
Universals, plates, sheets	1,065,200	1,217,099	16,013	Japan 866,473; Republic of Korea 154,621; Singapore 82,229.
Hoop and strip	37,478	46,393	505	Japan 34,227; Australia 7,346; Republic of Korea 1,853.
Rails and accessories	4,411	10,429	31	Poland 4,698; Australia 2,221; Japan 1,945.
Wire	9,495	20,658	471	Netherlands 10,128; Japan 5,814; China 812.
Tubes, pipes, fittings	249,352	275,929	26,674	Japan 206,269; Singapore 16,998; France 12,164.
Castings and forgings, rough	5,890	9,975	821	Japan 4,317; China 1,342; Singapore 725.
Lead:				
Ore and concentrate	300	--		
Oxides	1,081	1,023	--	Australia 419; West Germany 299; China 115.
Metal including alloys:				
Scrap	72	66	--	Australia 36; Japan 30.
Unwrought	7,398	8,082	10	Australia 7,149.
Semimanufactures	426	66,597	307	Australia 54,957; Japan 3,353; Canada 3,109.
Magnesium: Metal including alloys:				
Unwrought	8	32	10	Japan 12; France 10.
Semimanufactures	21	54	(1)	Republic of Korea 32; Japan 20.
Manganese:				
Ore and concentrate	11,968	9,513	--	Singapore 4,813; China 50.
Oxides	7,607	11,926	--	Singapore 8,020; Japan 3,388.
Mercury, 76-pound flasks	1,566	696	6	China 464; West Germany 102; Japan 73.

See footnotes at end of table.

Table 3.—Indonesia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Metalloids:				
Arsenic: Oxides and acids	99	71	(1)	France 20; West Germany 19; U.S.S.R. 15.
Unspecified	145	95	20	West Germany 43; Singapore 12; China 10.
Molybdenum: Metal including alloys, all forms kilograms	221	3,630	--	Mainly from Hungary.
Nickel:				
Ore and concentrate do	50	NA		
Metal including alloys:				
Unwrought	r20	12	--	Canada 8; Australia 4.
Semimanufactures	r2,479	4,329	1	Japan 2,440; Republic of Korea 1,556; Norway 248.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	428	15,979	9,292	Singapore 6,623.
Silver:				
Ore and concentrate[2] value, thousands	--	$163	$66	China $96.
Metal including alloys, unwrought and partly wrought troy ounces	4,719	66,038	--	United Kingdom 64,076; Australia 1,511.
Tin:				
Ore and concentrate	--	151	--	All from Singapore.
Oxides kilograms	6	--	--	
Metal including alloys, all forms	177	153	1	Australia 53; Singapore 48.
Titanium: Oxides	8,182	9,945	348	Japan 4,014; West Germany 2,643; France 1,227; Australia 1,143.
Tungsten: Metal including alloys, all forms	26	1	--	NA.
Uranium and/or thorium:				
Ore and concentrate	--	156	156	
Oxides and other compounds	170	225	7	France 168; China 45.
Zinc:				
Oxides	170	313	4	China 186; West Germany 76; Japan 31.
Blue powder	151	348	160	United Kingdom 57; Netherlands 52.
Metal including alloys:				
Scrap	662	1,050	107	Australia 610; Japan 307.
Unwrought	51,430	65,376	200	Australia 54,328; Canada 3,109; Japan 3,029.
Semimanufactures	917	887	160	Japan 186; China 99; Australia 76.
Other:				
Ores and concentrates	432	1,228	156	China 454; Australia 405; Philippines 144.
Oxides and hydroxides	224	318	18	Japan 181; West Germany 32; China 22.
Ashes and residues	--	61	--	Singapore 27; Australia 17.
Pyrophoric alloys	60	--	--	
Base metals including alloys, all forms	1,042	1,422	1	Australia 949; China 92.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	435	341	6	Japan 150; Malaysia 100; Netherlands 60.
Artificial: Corundum	--	1	1	
Dust and powder of precious and semiprecious stones kilograms	12	--	--	
Grinding and polishing wheels and stones	2,805	2,677	30	China 943; Japan 461; France 390.
Asbestos, crude	23,047	27,062	4	Canada 15,282; China 3,448; Mozambique 3,033.
Barite and witherite	21,031	25,863	1,153	Thailand 18,294; Sabang 5,935.
Boron materials:				
Crude natural borates	145	405	40	Sabang 227; Singapore 138.
Oxides and acids	941	2,204	876	Japan 1,303.
Cement	327,162	366,011	15,741	Philippines 100,339; Japan 76,088.
Chalk	58	46	1	West Germany 32; United Kingdom 12.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite kilograms	85	--	--	
Bentonite	6,137	19,529	16,539	Sabang 2,058; Singapore 432.
Chamotte earth and dinas earth	NA	363	--	Taiwan 301.

See footnotes at end of table.

Table 3.—Indonesia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products —Continued				
Crude —Continued				
Kaolin	13,318	13,688	1,517	Japan 5,400; Australia 3,762; Thailand 1,000.
Unspecified	3,582	3,848	358	Japan 1,647; Sabang 734; China 480.
Products:				
Nonrefractory	1,503	2,902	18	Italy 1,760; West Germany 244; Japan 173.
Refractory including nonclay brick	74,032	68,445	4,955	Japan 37,126; West Germany 11,534; Thailand 3,078.
Cryolite and chiolite	4	690	--	All from Japan.
Diamond:				
Gem, not set or strung value, thousands	--	$14	--	All from Singapore.
Industrial do	$111	$15	(1)	Canada $14.
Diatomite and other infusorial earth	723	435	184	Republic of Korea 135; Japan 60; West Germany 31.
Feldspar, fluorspar, related materials	13,611	13,133	--	China 4,810; India 3,881; Taiwan 1,800.
Fertilizer materials: Manufactured:				
Ammonia	48	34	2	Japan 17; Singapore 15.
Nitrogenous	70,467	472,478	21,000	Republic of Korea 192,355; West Germany 62,850; Italy 45,413.
Phosphatic	137,640	296,349	161,140	West Germany 34,433; Jordan 33,393; Morocco 24,500.
Potassic	142,166	237,081	16,660	West Germany 128,932; Canada 31,219; U.S.S.R. 16,628.
Unspecified and mixed	17,371	1,427	11	West Germany 1,383.
Graphite, natural	135	191	5	China 100; Japan 37; West Germany 15; Republic of Korea 15.
Gypsum and plaster	318,607	316,158	19	Australia 182,246; Japan 65,736; Thailand 64,905.
Halogens:				
Bromine	13	9	9	
Chlorine	118	194	17	Singapore 89; Malaysia 34; Netherlands 24.
Iodine	34	26	5	United Kingdom 18; Japan 2.
Lime	362	504	72	Singapore 198; United Kingdom 136; China 43.
Magnesium compounds: Magnesite	1,085	2,580	(1)	Japan 1,513; Republic of Korea 499; China 350.
Mica:				
Crude including splittings and waste	r260	389	84	China 142; Japan 46; Australia 28; Taiwan 28.
Worked including agglomerated splittings	r147	147	77	India 27; Japan 16.
Nitrates, crude	3,094	1,002	--	West Germany 1,000.
Phosphates, crude	105	260,592	66,148	Jordan 143,000; United Arab Emirates 42,000; Australia 9,430.
Pigments, mineral:				
Natural, crude	562	441	--	China 405.
Iron oxides and hydroxides, processed	1,835	2,197	40	China 954; West Germany 534; Japan 396.
Potassium salts, crude	101	100	--	All from Belgium-Luxembourg.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	--	$16	--	Canada $15.
Synthetic value	$875	$451	--	India $301; Singapore $150.
Pyrite, unroasted	(1)	499	--	All from Australia.
Salt and brine	542	492	14	West Germany 205; Singapore 90; Australia 55.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	271	275	38	France 55; Japan 54; West Germany 41.
Sodium carbonate, natural and manufactured	101,694	89,976	10,374	Japan 24,681; Kenya 16,500; France 14,024.
Sodium hydroxide	63,410	56,461	526	France 21,549; West Germany 9,621; China 5,214.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	686	27	3	Singapore 10; United Kingdom 10.
Worked	486	1,570	(1)	China 995; Italy 215; Singapore 133.
Dolomite, chiefly refractory-grade	2,471	1,670	--	Japan 1,310; France 350.
Gravel and crushed rock	2,757	1,212	2	Japan 652; France 284; India 69.

See footnotes at end of table.

Table 3.—Indonesia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Limestone other than dimension	32	100	--	All from Malaysia.
Quartz and quartzite	289	513	44	Japan 250; Taiwan 100; Australia 69.
Sand other than metal-bearing	2,844	2,318	757	Singapore 562; Taiwan 519; Japan 223.
Sulfur:				
Elemental:				
Crude including native and byproduct	2,623	10,398	5	Canada 9,421; Singapore 390; Japan 311.
Colloidal, precipitated, sublimed	50,608	89,526	50	Canada 72,107; Singapore 14,720; China 1,000.
Dioxide	5	--	--	
Sulfuric acid	2,797	2,264	74	Singapore 2,051.
Talc, steatite, soapstone, pyrophyllite	10,948	12,880	310	China 8,669; Republic of Korea 1,320; Singapore 703.
Other:				
Crude	2,373	5,450	7	China 2,425; Japan 1,743; Hong Kong 700.
Slag and dross, not metal-bearing	31,628	23,195	730	Japan 21,214; United Kingdom 863; Australia 251.
Oxides and hydroxides of barium, magnesium, strontium	1,965	1,724	57	Japan 1,495.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	3,829	6,839	913	Italy 1,970; Singapore 1,159; Japan 878.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	21,731	19,964	41	Singapore 8,523; Japan 5,648; China 5,478.
Carbon:				
Carbon black	25,643	26,790	235	Australia 16,955; Japan 3,746; Malaysia 2,744.
Gas carbon	13	--	--	
Coal, all grades including briquets	4,973	5,373	186	Mainly from Republic of Korea.
Coke and semicoke	32,548	27,689	--	Japan 15,907; China 3,806; Australia 670.
Hydrogen, helium, rare gases	119	451	50	Australia 131; Japan 127; Singapore 88.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	30,663	17,572	--	Mainly from Saudi Arabia.
Partly refined do.	1,794	90	6	Singapore 57; Netherlands 19.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	135,755	1,404	121	Netherlands 736; Singapore 380.
Gasoline:				
Aviation thousand 42-gallon barrels	NA	2,741	--	Singapore 2,697.
Motor do.	1,845	1,945	(1)	Singapore 1,395; Philippines 550.
Mineral jelly and wax do.	r30	29	2	China 8; West Germany 7; Netherlands 3.
Kerosine, jet fuel, and white spirit do.	6,465	6,956	1	Singapore 6,824.
Distillate fuel oil do.	1,698	2,756	9	Singapore 2,665.
Lubricants do.	798	598	184	Singapore 225; Japan 86.
Nonlubricating oils do.	154	570	19	Singapore 468.
Residual fuel oil do.	4,301	3,942	(1)	Mainly from Singapore.
Bitumen and other residues do.	851	1,136	89	Singapore 970; Taiwan 26; China 19.
Bituminous mixtures do.	63	42	1	Singapore 34.
Petroleum coke do.	8	(1)	--	Mainly from West Germany.
Tars and other crude chemicals derived from coal, gas, and petroleum	1,677	10,758	33	Japan 8,989; Australia 606; West Germany 551.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include some platinum-group ore and concentrate.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—Production of bauxite declined to 700,000 tons because of a substantial reduction in exports to Japan. The 1982 production was the lowest since 1966. Mine output from Bintan Island and nearby smaller islands was shipped to the washing plants at Koyang and stockpiled on Kijang Island for export to Japan. In 1982, all exports went to Japan. Exports to European markets have been stopped since 1980 because of the high freight rate.

In April 1982, P.T. Aneka Tambang, a state-owned mining company, signed a contract with Kaiser Aluminum Technical Services and Kaiser Engineering International, both units of Kaiser Aluminum and Chemical Corp. of the United States to supply the process technology, design engineering, and management for the alumina plant on Bintan Island. In November, a separate contract was signed between P.T. Aneka Tambang and a consortium led by Klöckner Industrie Anlagen of the Federal Republic of Germany for civil-engineering work, building the alumina plant, and supplying and installing machinery and other equipment. The cost of the project was estimated at over $900 million. According to the plan, the 600,000-ton-per-year capacity plant was scheduled for completion in mid-1986. About 450,000 tons will be sold to the smelter of P.T. Indonesia Asahan Aluminum (IN-ALUM) in northern Sumatra, and the remainder will be exported.[5]

Production of aluminum by IN-ALUM was about 30,000 tons in 1982. The Asahan smelter came onstream in February. The first exports of aluminum ingots were shipped from the Port of Kuala Tanjung in North Sumatra to Japan in October. The two export shipments scheduled for 1982 totaled 16,000 tons. According to company officials, the export price was $1,500 per ton f.o.b. compared with world spot market prices of $1,050 to $1,100 per ton. By year-end, about 140 potlines reportedly were operational. The plant capacity was expected to reach 150,000 tons per year in 1983 and 225,000 tons per year with a total of 510 potlines in 1984.[6] In 1982, all of the alumina used by the smelter was imported from Australia while the petroleum coke for the electrolysis process was imported from the United States.

Copper.—Mine production by Freeport Indonesia Inc. increased 20% as planned. The increased production was attributed to milling higher grade, block caved ore from the newly developed Ertsberg East underground mine located remotely at an elevation of 3,500 meters in a heavy rain forest. The average ore grade was 2.3% copper, 0.02 ounce of gold, and 0.26 ounce of silver per ton of ore in 1982. The output of concentrate rose to 225,000 tons in 1982 from 188,000 tons in 1981. In 1981, the concentrate contained 62,500 tons of copper, 48,400 troy ounces of gold, and 766,000 troy ounces of silver.

In 1981, 197,000 tons of copper concentrate, valued at $130 million, was exported to Japan, the Federal Republic of Germany, Taiwan, and Romania.

Gold and Silver.—Production of gold and silver by P.T. Aneka Tambang from the Cikotok Mine in southern Banten, West Java, increased in 1982. In addition, gold and silver were produced as a byproduct of copper by Freeport Indonesia at Ertsberg (see copper section). A small amount of gold reportedly was produced by locals using primitive mining methods in various parts of the country. Gold production by these small miners was unrecorded.

Jimberland Minerals NL of Australia, reportedly was to assist Indonesia in the investigation of gold enrichment cap and an underlying porphyry system at Mandor, about 90 kilometers from Pontianak on the west coast of Kalimantan. Jimberland was to provide management and technical services as well as all funds for exploration, development, and exploitation. In return, the company has the right to earn a 60% profit from the production of gold and a 70% profit from the production of the porphyry system. The preliminary sampling results indicate a recoverable grade of 0.3 gram of gold per cubic meter on the surface of the alluvials.[7]

Iron and Steel.—Production of iron sands increased substantially from that of 1981. Iron sands from the Cilacap Mine was for export to Japan and for domestic consumption, and the output from the Palabuhanratu Mine was for domestic consumption. Consumption of iron sands in Indonesia was mainly by the cement industry as an admixture in the manufacturing of portland cement.

Production of direct-reduced iron (DRI) by

P.T. Krakatau Steel dropped slightly in 1982 from that of 1981. The output in 1981-82 represented less than 50% of capacity. The poor export market resulting from the world economic recession was cited as the main reason for the low operating rate. The company exported most of its DRI to India, Singapore, Japan, and the Republic of Korea. Only about 10,000 tons of DRI was sold to a domestic minimill in Surabaya, East Java.

In 1982, P.T. Krakatau was to export 300,000 tons of DRI to India in exchange for iron ore pellets from Mandovi, India, under an agreement signed in 1981. A separate agreement was expected to be signed between Indonesia and India for P.T. Krakatau to receive and reduce iron ore pellets from the Kudremnkh pellet plant of India in 1983.

The second phase of the Krakatau Steel project including a 1-million-ton-per-year hot-strip mill and a slab plant was expected to be operational in the first quarter of 1983. In June 1982, an $808 million contract was awarded to a Franco-Spanish consortium to build an 850,000-ton-per-year capacity cold-rolling mill in Cilegon, West Java. The mill, P.T. Cold Rolling Mill Indonesia is 40% owned by Krakatau, 40% by the Liem Group, and 20% by the Ciputra Group of Indonesia.

Nickel.—Mine production of P.T. Aneka Tambang increased slightly to 1.6 million tons in 1982. Nickel ore production was from the Pomalaa area in Southeastern Sulawesi and Gebe Island, Northern Maluku. P.T. Aneka Tambang exported 1.1 million tons of ore, about 11% less than that of 1981, to Japan. About 70% of the ore exported to Japan was from Gebe Island.

Gebe Island is located near the western end of the bird's head of Irian Jaya. The island has an area of 35,530 acres and the nickel mining concession covers 3,000 acres. According to company officials, the nickel ore reserves in the area were estimated at 20 million tons. The average ore grade was between 1.8% and 2.5% nickel with 0.06% to 0.09% cobalt. The deposits on Gebe Island are between 15 and 30 meters thick. In 1980-82, exports of nickel ore to Japan were from a temporary harbor at a rate of 600,000 to 850,000 tons per year. The island reportedly lacks adequate energy and water supplies.[8]

Production of nickel ore and nickel matte by P.T. Inco at Soroako in South Sulawesi declined in 1982. Production of nickel matte was 13,600 tons in 1982 compared with 19,900 tons in 1981. Because of the low demand for nickel in the world market, P.T. Inco operated only one of three production lines in 1982. The company reportedly suffered a net loss of $61.2 million and was to reduce its work force by 450 to 3,200. The company exported most of its nickel matte to Japan.

The Pomalaa ferronickel plant of P.T. Aneka Tambang received 350,000 tons of wet ore (equivalent to 250,000 tons of dry ore containing 1.8% nickel) from the Pomalaa area and Gebe Island for manufacturing ferronickel. The ferronickel plant produced about 20,000 tons of ferronickel (containing 4,730 tons of nickel). Exports of ferronickel dropped 15% in 1982 from that of 1981.

After investing over $50 million in exploration of Gag Island over the past 10 years, P.T. Inco terminated its contract with the Government of Indonesia in 1981 because of unfavorable prospects for nickel in the world market. P.T. Inco was a joint venture company of United States Steel Corp. of the United States and Hoogovens BV of the Netherlands. The joint venture company originally planned to build a smelter on Gag Island to produce 50,000 tons per year of nickel and 1,400 tons per year of cobalt using a modified Sherritt-Gordon process.

Tin.—In 1982, mine production of tin concentrate remained at the same level as that of 1981. Indonesia was the world's second largest tin producer in 1982. Tin production of Indonesia by company and area for 1978-81 was as follows, in tons:

Company and area	1978	1979	1980	1981
P.T. Tambang Timah:				
Bangka Island	18,214	18,460	19,501	19,609
Belitung Island	4,928	5,390	5,417	6,364
Singkep Island	842	1,250	1,126	1,135
Bangkinang, Sumatra	80	64	72	71
P.T. Koba Tin:				
Koba, Bangka	2,914	3,808	5,262	6,581
P.T. Broken Hill Pty. Indonesia:				
Kelapa Kampit, Belitung	433	469	505	525
P.T. Riau Tin Mining:				
Tujuh Riau Island	--	95	644	1,110
Total	27,411	29,536	32,527	35,395

P.T. Tambang Timah, the state-owned tin mining company, set aside 6% to 7% of its annual budget for exploration in 1982. In the past, most of the company's mining and exploration activities were on and offshore

Sumatra. In an effort to increase tin production, the company planned to explore new tin deposits in Kalimantan.[9]

In 1982, all tin ore produced in Indonesia was refined at the Peltim tin smelter operated by P.T. Tambang Timah at Mentok on Bangka Island. In 1981, tin metal production at Peltim was 33,000 tons, of which 32,000 tons was exported mainly to Japan, the United States, the Federal Republic of Germany, Italy, France, and East European countries. Domestic consumption of tin was between 400 and 500 tons in 1981-82.

In August 1982, a contract was awarded to a consortium of Mannesmann Demag Sack of the Federal Republic of Germany and Hitachi Zosen Co. Ltd. of Japan to build the country's first tin-plating plant at Cilegon in West Java. Construction of the 130,000-ton-per-year capacity plant was expected to start in 1983 and be completed in 1986. The unnamed tin-plating plant would be a joint venture between P.T. Krakatau Steel, P.T. Tambang Timah, and P.T. Nusantara Ampera Bakti of Indonesia. According to a tin industry source, the plant would receive tin mainly from Bangka Island.

In 1982, The Indonesian Government participated in meetings in Bangkok, Jakarta, and Kuala Lumpur to form a tin producers association (see tin section, the Mineral Industry of Malaysia).

NONMETALS

Cement.—Indonesia's annual clinker capacity remained at 8.7 million tons in 1982. The capacity was underutilized because of unexpected machinery overhauls at several plants. Cement production was 7.2 million tons, about 600,000 tons short of the projected output for 1982. As a result of strong domestic demand, 510,000 tons of cement was imported from the Republic of Korea, Taiwan, and the Philippines to cope with shortages in several major cities.

According to the Indonesia Cement Producers Association, Indonesia's annual total clinker capacity will be increased by 1.1 million tons to 9.8 million tons in 1983. Cement production in 1981 and projected installed capacity in 1983 by company were as follows, in thousand tons:

Company	1981 Production	1983 Projected capacity
P.T. Indocement	2,111.1	3,200
P.T. Semen Andas Indonesia	--	1,000
P.T. Semen Baturaja	190.1	500
P.T. Semen Cibinong	1,166.9	1,250
P.T. Semen Gresik	1,293.7	1,500
P.T. Semen Kupang	--	60
P.T. Semen Nusantara	750.8	750
P.T. Semen Padang	925.3	930
P.T. Semen Tonasa	406.2	620
Total	6,844.1	9,810

In April 1982, a contract was awarded to Marubeni Corp. and Kawasaki Heavy Industries Ltd. of Japan for construction of a 1.2-million-ton-per-year capacity cement plant at Palimanan in Ceribong of West Java. P.T. Tridaya Manunggal Perkasa will manage the construction and operate the cement plant when completed in 1985.

Fertilizer Materials.—Production of nitrogen fertilizer in urea and ammonia and production of ammonium sulfate and triple superphosphate increased slightly. The output of urea and ammonia by the three state-owned fertilizer companies was 2 million tons and 25,000 tons, respectively. The combined production of ammonium sulfate and triple superphosphate was about 860,000 tons.

P.T. Pupuk Sriwijaya (PUSRI) operated four plants at Palembang in South Sumatra with an annual total capacity of 1.6 million tons of urea. P.T. Pupuk Kujan operated one plant at Cikompeck (Tjikampek) in West Java with an annual capacity of 590,000 tons of urea. P.T. Petrokimia Gresik, the only chemical and compound fertilizer producer in Indonesia, produced ammonium sulfate, urea, triple superphosphate, diammonium phosphate, and nitrogen-phosphorus-potassium (NPK) at Gresik, near Surabaya in East Java.

The phase I expansion project of P.T. Petrokimia Gresik was almost completed at yearend and was scheduled to produce triple superphosphate in March 1983. The new plant will have an annual capacity of 230,000 tons P_2O_5 of superphosphoric acid. By 1983, P.T. Petrokemia Gresik will have a

total triple superphosphate production capacity of 500,000 tons per year. Construction work on the phase II expansion project was started in February 1982 by Mitsubishi Corp. and Hitachi Shipbuilding and Engineering Co. Ltd. of Japan at Gresik, East Java.

In an effort to be self-sufficient in agricultural production and to become a net exporter of nitrogen fertilizer, Indonesia was building two more ammonia-urea plants. Construction of P.T. Pupuk Kalimantan Timur (Kaltim I) near Bontang, East Kalimantan, was completed and commenced trial operations. The $367 million ammonia-urea plant has an annual capacity of 570,000 tons of urea and 165,000 tons of ammonia. Construction work on the P.T. Asean-Aceh fertilizer plant was well underway for completion in 1983. The $313 million urea plant in Aceh of North Sumatra, will have an annual capacity of 570,000 tons of urea.

In March 1982, a $375 million contract was awarded to Kellogg Overseas Corp. of the United States and Toyo Menka Co. Ltd. and Kobe Steel Ltd. of Japan to construct an ammonia-urea plant. The plant, Kaltim II, also located near Bontang in East Kalimantan, will have an annual capacity of 570,000 tons of urea and 165,000 tons of ammonia. The plant was scheduled for completion in 1985.

Kaolin.—Kaolin production in Indonesia was mainly on Belitung and Bangka Islands. The output of the two areas accounted for 97% of Indonesia's kaolin production in 1981. The major producers were Martapura Co., P.T. Alter Abadi, and P.T. Kaolin Belitung Utama on Belitung Island and P.T. Libra Jaya Murni on Bangka Island. Most kaolin was consumed domestically by the ceramic industry for manufacturing white cement and as filling material in paint, rubber, and cosmetic products.

Indonesia's first kaolin processing plant was completed on Belitung Island and was expected to start operation in November 1982. The 27,000-ton-per-year capacity plant is owned by P.T. Tambang Timah, the state-owned tin mining company. The plant is capable of producing 9,000 tons per year of coating-grade material and 18,000 tons per year of filler grade. According to an industry source, 80% of the output will be distributed to the domestic paper industry and the remainder will be exported to Japan, Taiwan, and the Republic of Korea.

MINERAL FUELS

Coal.—Coal production from two operating mines in Sumatra increased to 480,000 tons in 1982. The Ombilin Mine in West Sumatra produced 300,000 tons while the Bukit Asam Mine in South Sumatra produced 180,000 tons. Both mines were operated by P.N. Tambang Batubara, the state-owned coal company.

Coal from Ombilin's open pit at Tanah Hitan and the underground mine at Sawah Luhung was brought to the new preparation plant near the mouth of the underground mine. The clean coal was transported by rail and conveyor to the town of Sawahlunto for delivery to a cement plant in Indarung, Sumatra, and other end users. In 1982, 143,000 tons of Ombilin coal was consumed domestically and 104,000 tons was exported to Malaysia, Bangladesh, Thailand, and the Republic of Korea. A 12-megawatt powerplant at the Ombilin Mine consumes 18,000 tons of coal per year. The coal reserves at the Ombilin Mine, estimated by P.N. Tambang Batubara, were 185 million tons with measured reserves of 95 million tons, indicated reserves of 66 million tons, and inferred reserves of 24 million tons.[10]

The Bukit Asam Mine produced bituminous coal from an open pit at Air Laya and anthracite coal from another open pit at Suban. The bituminous coal was consumed by the state-owned railroad company and a tin mining company in Bangka while the anthracite was sold to domestic tin and nickel smelters. Some bituminous coal and anthracite from the Bukit Asam Mine was exported to Malaysia.

The Bukit Asam Mine expansion project at Air Laya and at Muara Tiga areas was awarded to Bukit Asam Mine Constructors (BAMCO) in November 1981. BAMCO is a joint venture of Morrison-Knudsen International Co. Inc. of the United States and Rhenraun Consulting GmbH of the Federal Republic of Germany. The three-stage development was scheduled for completion at yearend 1984 and was to start at an annual rate of 750,000 tons in 1985. The $350 million project was financed partially by a $185 million loan from the World Bank and by the Government of Indonesia. The coal reserves of the Bukit Asam (Air Laya) Mine were estimated at 223 million tons with measured reserves of 101 million tons, indicated reserves of 109 million tons, and inferred reserves of 13 million tons.[11]

To develop coal in Kalimantan, P.N. Tambang Batubara signed 3 additional production-sharing contracts with foreign joint venture companies in 1982. The terms of the contract were similar to 1981 contracts between P.N. Tambang Butubara and other foreign companies. P.T. Kaltim Prime Coal, a joint venture of Conzinc Rio Tinto Ltd. of Australia and British Petroleum Ltd. of the United Kingdom, was to develop a coal concession of 7,900 square kilometers near Samarinda in northeastern Kalimantan. A consortium from the Republic of Korea led by Samchuk Consolidated Coal Mining Co. was to develop a coal concession of 2,600 square kilometers near Balikpapan in East Kalimantan. Empresa Nacional Adaro de Investigaciones Minerales S.A. of Spain was to develop a coal concession of 1,500 square kilometers in the Tanjung region of South Kalimantan.

A joint venture firm of Nissho-Iwai Corp. of Japan and Mobil Oil Corp. of the United States as well as a joint venture firm of Tasek Cement Bhd. of Malaysia and Siam Cement Co. of Thailand, are expected to sign similar production-sharing contracts with P.N. Tambang Batubara for coal development near Berau in East Kalimantan and near Enadimsa in South Kalimantan, in 1983.

The Senakin coal mine, operated by P.T. Arutmin Indonesia, a joint venture firm of Atlantic Richfield Co. and Utah Exploration Inc. of the United States, was expected to start production in 1985. The coal concession at Senakin near Banjarmasin in South Kalimantan, where the reserves were estimated at 100 million tons, is the largest coal deposit in Kalimantan.

Petroleum and Natural Gas.—Production of crude petroleum and natural gas declined. The output of crude oil dropped to an average of 1.34 million barrels per day in 1982 from 1.61 million barrels per day in 1981 because of the production ceiling imposed by OPEC for Indonesia effective April 1982. However, the output of natural gas remained at 1.1 trillion cubic feet.

Crude oil was produced by PERTAMINA, the Government oil and gas enterprise; LEMIGAS, the Indonesia Petroleum Institute; three contract-of-work contractors led by CPI; and 16 production-sharing contractors led by Atlantic Richfield Indonesia (ARCO).

CPI remained the largest crude oil producer accounting for 36.0% in 1982, followed by ARCO, 9.6%; Indonesia Petroleum Ltd. (INPEX), 8.6%; Independent Indonesia American Petroleum Co., 8.3%; Total Indonésie (Compagnie Français du Petrol), 6.1%; Mobil Oil Indonesia Inc., 5.7%; and PERTAMINA, 5.6%. The remaining 20.1% was produced by 2 contractors under contract-of-work agreements with Indonesia, 11 contractors under production-sharing agreements, and LEMIGAS. About 57% of the output was from Sumatra, 35% from Lepaspantai (offshore areas), and 8% from the Kalimantan, Irian Jaya, and Java areas.

In 1982, an important contract negotiation was conducted between PERTAMINA and CPI. CPI has been operating in Indonesia under a contract-of-work agreement signed in 1962 and expires in November 1983. Under the 1962 agreement the split of revenue between PERTAMINA and CPI was 60:40. In 1971, a production-sharing agreement was reached between PERTAMINA and CPI to cover 1983 through 2001. Under the 1971 contract, the production split between PERTAMINA and CPI, respectively, was 70:30 for old oilfields and a three-tier system, ranging between 65:35 and 70:30, based on output from new oilfields which need more capital investment. In 1978, the three-tier system for the new oilfields was renegotiated between the two sides when CPI agreed to a single split of 85:15 as the basic terms of the 1971 production-sharing contract. During the second half of 1982, the 1978 agreement was reopened for negotiation by both sides. In October, CPI reportedly rejected a 95:5 split ratio proposed by PERTAMINA.[12] CPI reportedly was continuing renegotiations with PERTAMINA at yearend.

According to PERTAMINA, the three-tier system of production-sharing contracts with other companies have a split ratio of 85:15 for the contractor producing under 150,000 barrels per day, 90:10 for 150,000 to 250,000 barrels per day, and 95:5 for more than 250,000 barrels per day. Crude oil output by CPI averaged over 600,000 barrels per day during the first half of 1982, and the company was producing 737,000 barrels per day during the second half of 1981.[13]

In 1982, natural gas was produced by PERTAMINA, LEMIGAS, three contract-of-work contractors led by P.T. Stanvac Indonesia, and 15 production-sharing contractors led by Mobil Oil Indonesia Inc. The top six natural gas producers were Mobil Oil Indonesia accounting for 40.5%; Roy M. Huffington Inc., 18.2%; PERTAMINA,

16.5%; INPEX, 4.7%; ARCO, 4.2%; and P.T. Stanvac, 4.0%. The remaining 11.9% was produced by 14 companies.

Of the 1.1 trillion cubic feet of natural gas produced in Indonesia in 1982, 16.2% was flared or lost. About 926 billion cubic feet was consumed as follows: 54% for manufacturing LNG; 25% for pressure maintenance in oilfields; 6% for PUSRI's production of urea; 6% for a urea plant at Cikampack, the Krakatau Steel mill at Cilegon, a cement plant at Cibinong, and for city gas in Jakarta and Bogor; and 9%, other.

Oil exploration activities in Indonesia increased as 13 more production-sharing contracts were signed in 1982. Since 1979, PERTAMINA has signed 48 production-sharing contracts with foreign companies primarily from the United States, Canada, the United Kingdom, France, the Netherlands, Japan, and the Republic of Korea. Of these 48 contracts, 21 were for onshore exploration and 27 were for offshore exploration. According to an industry source, 284 exploratory wells were to be drilled in 1982 compared with 244 wells in 1981. The foreign companies were committed to spend about $1.1 billion for exploration in 1982 compared with $976 million in 1981.

Several important new oilfields were discovered in Indonesia. The most significant discovery was made by Asamera Oil Corp. of Canada in the Ramba and Tanjung Laban Oilfields of South-Central Sumatra. Other discoveries included the Sundari Oilfields by Natomas of the United States offshore southeast Sumatra, the Buton I Oilfields by CPI offshore near the east coast of Sumatra in the Strait of Malacca, and the West Yakin Oilfields by Union Oil Co. of Indonesia offshore East Kalimantan.

In December, CPI started oil production from its Waduk Oilfield in Riau of East Sumatra at an initial rate of 10,200 barrels per day. In early May, CPI also began oil production from the Zamrud Oilfield in Riau at the rate of 21,300 barrels per day. In September, Natomas brought a new oil processing facility into operation offshore the Krisna Oilfields in the Java Sea. The new crude processing platform that separates the oil, gas, and water weighs 4,800 tons and has a capacity to process 300,000 barrels of liquid (oil and water) per day.[14]

Exports of crude petroleum dropped 17% to 830,000 barrels per day in 1982, while exports of LNG rose 5% to 9.1 million tons. Japan and the United States remained the main importer of the crude oil, and Japan was still the single buyer of Indonesian LNG.

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[1]Economist, Division of Foreign Data.
[2]U.S. Embassy, Jakarta, Indonesia. State Department Telegram 08367, May 31, 1983.
[3]The Asian Wall Street Journal. V. 7, No. 186, May 26, 1983, pp. 1, 4.
[4]Where necessary, values have been converted from Indonesian rupiahs (Rp) to U.S. dollars at the rate of Rp692.5=US$1.00.
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[5]The Asian Wall Street Journal. V. 7, No. 51, Nov. 10, 1982, p. 3.
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[6]Kompas (Jakarta). Oct. 16, 1982, p. 1.
[7]Mining Journal (London). Jan. 22, 1982, p. 65.
[8]Kompas (Jakarta). Nov. 8, 1982, p. 2.
[9]Business Times (Kuala Lumpur). Aug. 11, 1982, p. 22.
[10]U.S. Embassy, Jakarta, Indonesia. State Department Airgram A-014, June 18, 1982, pp. 3-4.
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The Mineral Industry of Iran

By John R. Lewis[1]

Economic and social conditions in Iran showed little change during 1982 from those that first developed in 1978-79 during and immediately after the revolution. Furthermore, the war between Iran and Iraq continued its adverse effects upon the mineral industry of Iran. Mineral exploration and development, even for oil and gas, were virtually at a standstill. Crude oil, crippled as the industry was, still provided Iran with a large percentage of its foreign exchange earnings. Selected industrial installations, such as the steel mill at Ahwaz and oil installations everywhere, were slowly being rehabilitated. Production and/or processing of aluminum, chromite, copper, lead, zinc, and magnesite were mildly improved during the year, with the majority consumed within Iran.

PRODUCTION AND TRADE

The production of mineral commodities required by the nation's economy showed signs of modest increases. In the area of crude petroleum and natural gas, increases in production, export, and domestic refining all made better showings than other minerals, primarily because the wells were in existence and the crude could be sold to other nations.

Expansion of commercial exchanges with friendly nations were actively pursued throughout the year by the Iranian Government. The principal tool in such trade was crude oil, either sold for currency or offered in barter.

Turkey was one of Iran's larger trading partners. Among mineral products imported from Turkey were iron and steel products, plastics, synthetic rubber, and chemicals. Japan was a big buyer of Iranian oil at attractive prices somewhat below the official levels established by the Organization of Petroleum Exporting Countries (OPEC). Controlled economy countries were taking 200,000 barrels of Iranian oil per day during the year, Western Europe took 370,000 barrels per day, Iran's Middle Eastern neighbors took 250,000 barrels per day, and countries in the Far East (other than Japan) took 170,000 barrels per day. Steel products from Japan were imported by Iran. Syria sold phosphate to Iran and bought its crude oil.

Bartering crude for items required by Iran was very common. Barter arrangements were made with Greece for ships and petrochemicals, with Nicaragua and New Zealand for food, and with Brazil for a variety of commodities.

Table 1.—Iran: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal, primary ingot	[3]25,500	14,000	10,000	25,000	37,500
Chromium: Chromite, gross weight	[3]198,000	136,000	80,000	30,000	40,000
Copper:					
Mine output, metal content	[r]6,000	[r]3,000	1,000	2,000	23,500
Metal:					
Smelter	6,000	700	800	800	13,500
Refined	6,000	3,000	1,000	1,000	--
Iron and steel:					
Iron ore, gross weight thousand tons	[3]1,560	609	600	600	750
Metal:					
Pig iron do	900	800	800	500	600
Steel, crude do	780	700	700	500	550
Lead, mine output, metal content[e]	30,000	15,000	15,000	10,000	11,000
Manganese ore, gross weight	30,000	20,000	([4])	([4])	--
Zinc, mine output, metal content	45,000	25,000	30,000	35,000	34,800
NONMETALS					
Barite	200,000	180,000	150,000	75,000	80,000
Cement, hydraulic thousand tons	12,000	9,000	8,000	8,000	9,500
Clays:					
Bentonite[e]	40,000	20,000	20,000	10,000	11,000
Fire clay	70,000	70,000	50,000	40,000	50,000
Kaolin	180,000	160,000	150,000	100,000	110,000
Feldspar	3,000	3,000	2,500	2,000	2,500
Gem stones: Turquoise, crude	[3]35	NA	NA	20	NA
Gypsum thousand tons	8,000	7,000	7,000	6,000	5,000
Lime[e] do	900	500	500	500	550
Magnesite	5,000	5,000	4,000	4,000	4,000
Nitrogen: N content of ammonia	[3]178,400	[3]183,300	217,800	200,000	210,000
Pigments, mineral, natural	2,000	1,000	500	500	600
Salt, rock[e] thousand tons	700	700	600	600	700
Sodium compounds: Caustic soda	20,000	20,000	NA	10,000	12,000
Stone, sand and gravel:					
Limestone thousand tons	15,000	NA	11,000	11,000	14,000
Marble do	450	NA	NA	200	200
Silica do	NA	NA	NA	200	200
Travertine do	350	NA	NA	100	100
Strontium minerals: Celestite[e]	[r]16,500	[r]8,800	5,500	5,000	4,500
Sulfates, natural:					
Aluminum-potassium sulfate (alum)	8,000	NA	NA	3,000	3,000
Sodium sulfate (mineral not specified)[e]	35,000	NA	NA	20,000	20,000
Sulfur:					
Native thousand tons	150	75	70	50	10
Byproduct of petroleum and natural gas do	300	200	150	6	10
Total do	450	275	220	56	20
Sulfuric acid do	[e]200	[e]100	100	70	100
Talc	[e]400	[e]400	300	200	250
MINERAL FUELS AND RELATED MATERIALS					
Coal thousand tons	900	[e]900	700	600	700
Coke do	500	[e]400	400	350	350
Gas, natural:					
Gross million cubic feet	[3]1,947,595	[r 3]1,402,000	[3]709,115	[3]593,284	600,000
Marketed do	[3]687,397	[r 3]705,940	[3]292,050	[3]254,265	200,000
Natural gas liquids, all forms thousand 42-gallon barrels	16,000	[e]500	2,000	2,000	2,500
Petroleum and refinery products:					
Crude[5] do	[3]1,913,221	[r 3]1,156,300	[3]536,000	[3]480,300	750,000
Refinery products:					
Gasoline:					
Aviation do	[3]2,931	2,500	--	15,000	--
Motor do	[r 3]36,938	[r 3]31,025	27,340	24,000	28,000
Jet fuel do	[3]11,038	10,000	--	15,000	--
Kerosine do	[r 3]42,670	[r 3]41,975	[3]36,975	30,000	40,000
Distillate fuel oil do	[3]50,705	[r 3]52,195	[3]45,990	40,000	43,000
Residual fuel oil do	[3]100,195	[r 3]100,740	88,730	70,500	80,000
Lubricants do	[3]3,376	3,000	--	--	--

See footnotes at end of table.

Table 1.—Iran: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Asphalt thousand 42-gallon barrels	[3]10,671	9,500	[3]13,505	14,000	15,000
Refinery fuel and losses do	[3]4,336	4,000	NA	1,000	NA
Total do	[r 3]262,860	254,935	212,540	209,500	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Reported data are for years beginning Mar. 21 of that stated, except those for natural gas and petroleum, which are for regular calendar years. Table includes data available through July 21, 1983.

[2]In addition to the commodities listed, other types of crude construction materials (such as common clays, sand and gravel, and other varieties of stone) are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Revised to zero.

[5]Excludes petroleum reinjected into fields.

Table 2.—Iran: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	--	2	2	
Semimanufactures	13	--		
Chromium: Ore and concentrate	29,329	5,133	--	Yugoslavia 2,900; Austria 2,233.
Copper:				
Ore and concentrate	4,200	--		
Metal including alloys, scrap	--	44	--	All to Japan.
Iron and steel: Metal:				
Scrap	9,184	12,220	--	All to Pakistan.
Semimanufactures:				
Bars, rods, angles, shapes, sections	154	153	--	All to Saudi Arabia.
Universals, plates, sheets	--	1	--	All to United Kingdom.
Hoop and strip	4	--		
Wire	8	--		
Tubes, pipes, fittings	48	--		
Castings and forgings, rough	126	--		
Lead:				
Ore and concentrate	8,817	5,000	--	All to Singapore.
Metal including alloys, scrap	40	--		
Platinum-group metals:				
Waste and sweepings value, thousands	--	$418	--	France $261; West Germany $157.
Metals including alloys, unwrought and partly wrought, unspecified do	$2	--		
Silver:				
Waste and sweepings do	--	$2	--	Austria $1; France $1.
Metal including alloys, unwrought and partly wrought do	$367	$4	--	All to Saudi Arabia.
Zinc: Ore and concentrate	33,344	--		
Other:				
Oxides and hydroxides	12,940	--		
Ashes and residues	3,208	--		
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	17	--		
Clays and clay products: Products, nonrefractory	23	--		
Diamond:				
Gem, not set or strung value, thousands	$383	$83	$75	France $8.
Industrial do	--	$56	--	All to Switzerland.
Fertilizer materials:				
Crude, n.e.s	--	323	--	All to United Arab Emirates.
Manufactured, ammonia	96,749	--		
Lime	69	12	--	All to United Arab Emirates.
Magnesium compounds: Magnesite	4	--		

See footnotes at end of table.

Table 2.—Iran: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond: Natural ____ value, thousands__	$166	$442	$188	West Germany $164; Switzerland $90.
Salt and brine_____	198	154	__	Oman 102; United Arab Emirates 52.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked _____	11,360	76	__	Mainly to United Arab Emirates.
Worked _____	33	__		
Gravel and crushed rock _____	5,429	__		
Sand other than metal-bearing _____	__	200	__	All to United Arab Emirates.
Sulfur: Elemental:				
Crude including native and byproduct ____	[2]14,201	18	__	All to Saudi Arabia.
Colloidal, precipitated, sublimed _____	__	6	__	Do.
MINERAL FUELS AND RELATED MATERIALS				
Coke and semicoke _____	219,200	__		
Petroleum and refinery products:				
Crude____ thousand 42-gallon barrels__	e [3]291,592	169,336	__	Japan 49,219; Spain 33,460; Italy 15,740; West Germany 11,082.
Refinery products:				
Liquefied petroleum gas ____do____	1,249	__		
Gasoline _____do____	7,203	1,105	__	Netherlands 325; Italy 305; Switzerland 203.
Kerosine and jet fuel _____do____	6	([4])	__	All to Saudi Arabia.
Distillate fuel oil _____do____	623	([4])	__	All to Belgium-Luxembourg.
Lubricants _____do____	223	__		
Residual fuel oil _____do____	[5]45,458	2,912	__	Singapore 1,589; Italy 585; France 433; Belgium-Luxembourg 293.
Bitumen and other residues___do____	__	2,052	__	Spain 2,046; United Arab Emirates 5.
Bituminous mixtures value, thousands__	__	$148	__	All to United Arab Emirates.
Unspecified and bunkers thousand 42-gallon barrels__	3,500	__		
Tars and other crude chemicals derived from coal, gas, and petroleum _____	26,126	__		

[e]Estimated.

[1]Owing to a lack of official trade data published by Iran, this table should not be taken as a complete presentation of Iran's mineral exports. These data have been compiled from various sources, which include United Nations information and data published by partner trade countries. Unless otherwise specified, data are compiled from trade statistics of individual trading partners.

[2]Excludes imports by Australia valued at $1,349,000.

[3]Annual Statistical Bulletin 1980, published by Organization of Petroleum Exporting Countries, Vienna, Austria.

[4]Less than 1/2 unit.

[5]Excludes imports by New Zealand valued at $17,573,000.

Table 3.—Iran: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified _____ value thousands__	__	$24	__	West Germany $12; Belgium-Luxembourg $6; United Kingdom $6.
Aluminum:				
Ore and concentrate_____	4	500	__	All from West Germany.
Oxides and hydroxides _____	751	515	__	West Germany 373; Japan 121; United Kingdom 20.
Metal including alloys:				
Unwrought _____	3,140	14,311	__	West Germany 9,489; Austria 1,291; Yugoslavia 1,037.
Semimanufactures_____	12,134	11,161	1	Belgium-Luxembourg 2,069; West Germany 1,698; Switzerland 1,461; Austria 1,409.
Chromium: Oxides and hydroxides _____	449	19	__	United Kingdom 18; Japan 1.

See footnotes at end of table.

Table 3.—Iran: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Cobalt:				
Oxides and hydroxides value, thousands	$19	$28	--	West Germany $10; Japan $6; Netherlands $5; Spain $5.
Metal including alloys, all forms[2] kilograms	168	4,300	--	West Germany 2,300; France 2,000.
Columbium and tantalum: Metals including alloys, all forms, tantalum value, thousands	--	$2	--	All from Switzerland.
Copper:				
Sulfate	--	40	--	All from Spain.
Metal including alloys:				
Scrap	21	--		
Unwrought	298	1,921	--	Spain 1,400; Belgium-Luxembourg 340; Italy 120.
Semimanufactures	[3]30,779	33,275	([4])	Japan 8,073; West Germany 7,461; Spain 6,171; Belgium-Luxembourg 4,247.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	--	129	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate	2	24	--	United Arab Emirates 16; Netherlands 8.
Metal:				
Pig iron, cast iron, related materials	619	585	--	Sweden 380; West Germany 81; France 60.
Ferroalloys, unspecified	1,915	4,131	--	Norway 2,422; West Germany 1,037; Spain 200.
Steel, primary forms	631,039	437,418	--	Japan 132,125; Czechoslovakia 97,000; Poland 79,060; West Germany 67,451.
Semimanufactures:[5]				
Bars, rods, angles, shapes, sections	989,766	491,341	8	Spain 301,024; West Germany 64,852; Japan 53,343; Italy 37,729.
Universals, plates, sheets	599,895	521,871	203	Japan 259,006; West Germany 119,970; Spain 55,238.
Hoop and strip	27,202	65,005	--	West Germany 36,364; Japan 20,810; United Kingdom 3,848.
Rails and accessories	273	7,216	--	Japan 5,581; Austria 1,429; Italy 111.
Wire	12,580	18,479	--	Japan 10,120; West Germany 3,350; Austria 1,509.
Tubes, pipes, fittings	72,230	155,219	247	Spain 70,281; West Germany 28,891; Italy 13,070.
Castings and forgings, rough	1,051	644	--	Italy 335; Japan 139; United Kingdom 123.
Unspecified	--	950	--	All from Poland.
Lead:				
Oxides and hydroxides	29	([4])	--	All from West Germany.
Metal including alloys:				
Unwrought	2,244	828	--	United Kingdom 534; West Germany 294.
Semimanufactures	51	145	--	Sweden 52; Belgium-Luxembourg 32; Japan 30.
Magnesium: Metal including alloys, all forms	14	--		
Manganese:				
Ore and concentrate	3,188	--		
Oxides	69	50	--	All from Japan.
Mercury 76-pound flasks	435	[6]116	--	United Kingdom 87; West Germany 29.
Metalloids:				
Arsenic, oxides and acids	--	16	--	All from Spain.
Unspecified	21,202	7,391	--	France 7,080; Norway 300; West Germany 11.
Molybdenum: Metal including alloys, all forms kilograms	1,485	[7]4,670	--	West Germany 4,000; Japan 670.
Nickel:				
Matte and speiss	7	--		
Metal including alloys:				
Unwrought	142	141	--	United Kingdom 108; West Germany 20; Netherlands 8.
Semimanufactures	156	126	--	Austria 58; West Germany 33; Japan 15.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,389	$1,308	--	West Germany $1,193; Italy $76; Switzerland $39.
Silver: Metal including alloys, unwrought and partly wrought do	$1,493	$1,207	--	West Germany $1,051; Spain $100; France $25.
Tin: Metal including alloys:				
Unwrought	1,081	654	--	Singapore 592; United Kingdom 21; Sweden 20.
Semimanufactures	70	22	--	Belgium-Luxembourg 6; West Germany 5; Italy 4.

See footnotes at end of table.

Table 3.—Iran: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	--	2,000	--	All from Netherlands.
Oxides and hydroxides	696	396	--	Japan 330; Spain 50; Italy 16.
Metal including alloys, all forms	([4])	--		
Tungsten: Metal including alloys, all forms ---- kilograms	2,374	[8]14,723	--	United Kingdom 14,000; Japan 723.
Zinc:				
Oxides	408	462	--	Yugoslavia 367; Belgium-Luxembourg 56; United Kingdom 29.
Metal including alloys:				
Unwrought	4,347	2,287	--	Belgium-Luxembourg 700; Finland 496; West Germany 324.
Semimanufactures	272	[9]259	--	France 231; West Germany 23; Belgium-Luxembourg 5.
Other:				
Ores and concentrates	20	2	--	All from Switzerland.
Oxides and hydroxides	7,504	34	--	Canada 33; Japan 1.
Pyrophoric alloys	--	6	--	All from Japan.
Base metals including alloys, all forms	4	87	--	West Germany 84; United Arab Emirates 2; Sweden 1.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	18	204	--	Greece 95; Netherlands 69; Italy 37.
Artificial: Corundum	4	232	--	West Germany 195; Japan 37.
Dust and powder of precious and semi-precious stones ---- value, thousands	$13	$3	--	All from West Germany.
Grinding and polishing wheels and stones	1,127	2,461	--	West Germany 933; Italy 616; Denmark 360; Austria 141.
Asbestos, crude	101	1,131	--	Cyprus 650; Yugoslavia 400; Belgium-Luxembourg 71.
Boron materials: Oxides and acids	51	3	--	West Germany 2; Japan 1.
Cement	53,401	2,636	--	France 1,557; United Kingdom 596; United Arab Emirates 333.
Chalk	589	276	--	Austria 240; United Arab Emirates 36.
Clays and clay products:				
Crude, unspecified	6,977	1,642	--	Spain 1,000; Denmark 500; West Germany 133.
Products:				
Nonrefractory	9,465	4,815	--	Italy 2,327; Spain 1,170; Greece 435; Yugoslavia 434.
Refractory including nonclay brick	7,683	6,284	--	West Germany 2,958; Austria 1,527; Italy 521; United Kingdom 427.
Cryolite and chiolite	--	21	--	All from Switzerland.
Diamond:				
Gem, not set or strung -- value, thousands	$410	$13	--	All from France.
Industrial ---- do	$1,373	$1,956	--	Switzerland $1,955; West Germany $1.
Diatomite and other infusorial earth	12	325	--	Japan 100; Italy 98; Iceland 55.
Feldspar, fluorspar, related materials	103	150	--	All from Finland.
Fertilizer materials:				
Crude, n.e.s	--	286	([4])	Mainly from United Arab Emirates.
Manufactured:				
Ammonia	202	426	--	Netherlands 361; Belgium-Luxembourg 48; West Germany 17.
Nitrogenous	87,843	260,127	--	U.S.S.R. 189,106; Saudi Arabia 59,000; Italy 11,952.
Phosphatic	--	15,286	15,057	Pakistan 216; Italy 10; United Kingdom 3.
Potassic	31	17	--	All from West Germany.
Unspecified and mixed	816	30,515	--	Spain 29,195; United Kingdom 736; Switzerland 356.
Graphite, natural	108	936	--	West Germany 566; Austria 370.
Gypsum and plaster	553	1,297	--	All from West Germany.
Halogens: Unspecified	--	1,304	--	Mainly from West Germany.
Lime	583	4,575	--	United Kingdom 4,525; United Arab Emirates 49; Bahrain 1.
Magnesium compounds: Magnesite	1,575	2,454	--	Greece 1,429; Austria 1,000; West Germany 22.
Mica: Worked including agglomerated splittings	3	2	--	Mainly from Spain.
Phosphates, crude	--	1	1	
Pigments, mineral: Iron oxides and hydroxides, processed	1,151	1,194	--	West Germany 873; Japan 210; Spain 60.
Precious and semiprecious stones other than diamond:				
Natural ---- value, thousands	$265	$40	--	All from Switzerland.
Synthetic ---- do	$4	$31	--	All from West Germany.

See footnotes at end of table.

Table 3.—Iran: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Salt and brine	508	75	--	Oman 70; Japan 5.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	--	253	--	France 210; Japan 41; United Kingdom 2.
Sodium carbonate, natural and manufactured	13,588	743	--	West Germany 707; France 19; Yugoslavia 17.
Sodium hydroxide	21,050	28,174	--	Spain 8,180; West Germany 7,672; Italy 5,311; United Kingdom 2,530.
Stone, sand and gravel:				
Dimension stone, worked	124	218	--	Italy 173; United Kingdom 45.
Gravel and crushed rock	113	119	--	Netherlands 84; France 35.
Quartz and quartzite	688	395	--	Finland 250; Japan 74; West Germany 60; Switzerland 11.
Sand other than metal-bearing	404	6	--	All from West Germany.
Sulfur:				
Elemental:				
Crude including native and byproduct	227	215	--	West Germany 161; United Kingdom 36; Belgium-Luxembourg 18.
Colloidal, precipitated, sublimed	129	33	--	Japan 32; West Germany 1.
Dioxide	5	48	--	All from Sweden.
Sulfuric acid	50	15,453	--	Japan 14,930; Netherlands 279; Belgium-Luxembourg 200.
Talc, steatite, soapstone, pyrophyllite	62	1,515	--	Finland 985; Japan 500; West Germany 16.
Other:				
Crude	1,434	639	--	Spain 548; United Kingdom 56; West Germany 20.
Slag and dross, not metal-bearing	10	36	--	All from Netherlands.
Oxides and hydroxides of barium, magnesium, strontium	70	172	--	West Germany 139; Japan 33.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	3,574	--	Yugoslavia 3,451; United Kingdom 36; West Germany 36.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	30	70	--	All from Saudi Arabia.
Carbon: Carbon black	401	3,997	--	West Germany 3,885; Japan 77; United Kingdom 20.
Coal: Anthracite and bituminous	28,351	54,058	--	West Germany 54,015; United Kingdom 43.
Coke and semicoke	55	1,462	--	All from West Germany.
Hydrogen, helium, rare gases	--	19	--	United Arab Emirates 17; Japan 2.
Peat including briquets and litter	681	1,281	--	Finland 719; Sweden 548; West Germany 14.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	11,797	23,130	--	Italy 20,694; France 1,369; Greece 1,067.
Gasoline do	570	1,479	--	West Germany 442; Pakistan 425; Japan 314.
Mineral jelly and wax do	13,961	39,074	--	West Germany 23,311; Japan 7,728; Netherlands 2,369.
Kerosine and jet fuel thousand 42-gallon barrels	10	1,253	--	Italy 723; Portugal 512; Greece 18.
Distillate fuel oil do	1	3,227	--	Italy 1,671; Singapore 551; Spain 375; France 242.
Lubricants 42-gallon barrels	[10]77,710	486,861	314	West Germany 182,469; Spain 116,858; Netherlands 69,258; Belgium-Luxembourg 45,066.
Residual fuel oil do	3,330	11,102	--	All from Greece.
Bitumen and other residues do	2,818	4,484	--	All from West Germany.
Bituminous mixtures do	2,763	2,066	--	West Germany 1,570; United Kingdom 442; Switzerland 54.
Petroleum coke do	4,626	62,496	55,000	West Germany 7,496.
Unspecified do	--	2,919	2	West Germany 2,156; Japan 761.

See footnotes at end of table.

Table 3.—Iran: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Tars and other crude chemicals derived from coal, gas, and petroleum	4,704	2,528	--	Italy 2,230; West Germany 250; United Kingdom 48.

[1]Owing to a lack of official trade data published by Iran, this table should not be taken as a complete presentation of Iran's mineral imports. These data have been compiled from various sources, which include United Nations information and data published by the partner trading countries. Unless otherwise specified, data are compiled from trade statistics of individual trading partners.

[2]Totals exclude unreported quantities exported by Sweden valued at $20,000 in 1980 and $17,000 in 1981.

[3]Total excludes unreported quantity exported by Australia valued at $72,000.

[4]Less than 1/2 unit.

[5]Totals in 1980 exclude unreported quantities of bars, rods, angles, shapes, and sections valued at $2,282,000, hoop and strip valued at $817,000, and wire valued at $1,716,000; all exported by Japan.

[6]Total excludes unreported quantities valued at $4,000 from the Netherlands, $1,000 from Belgium-Luxembourg, and $1,000 from Switzerland.

[7]Total excludes unreported quantities valued at $4,000 from Norway and $2,000 from Switzerland.

[8]Total excludes unreported quantities valued at $46,000 from France, $3,000 from Belgium-Luxembourg, and $1,000 from the Federal Republic of Germany.

[9]Total excludes unreported quantity valued at $737,000 exported by the United Kingdom.

[10]Total excludes unreported quantity valued at $314,000 exported by Japan.

COMMODITY REVIEW

METALS

Aluminum.—The 50,000-ton-per-year aluminum smelter owned by the Iranian Aluminum Co. and located at Arak, in central Iran, was operating at about 75% of capacity during 1982 amid announcements from the Ministry of Mining and Metals of forthcoming expansion activities. The eventual production goal, which had been stated for several years, was 120,000 tons per year. The plant was operating with alumina from the Indian Aluminum Co. Ltd. plant at Mysore, India. Electricity was produced at the site, but problems in the generating plant were reportedly hampering output. A recycling plant capable of handling 37 tons of secondary aluminum per day went into operation during the year.

Copper.—The copper smelter at Sar Cheshmeh in central Kerman Province began producing blister copper about midyear. Construction was assisted by specialists from Yugoslavia's Bor Copper Institute. Capacity was expected eventually to be about 150,000 tons per year, although about 55,000 tons were produced in the first year's operation. At the outset, production was to be absorbed by the domestic market. About 1,000 tons per day of sulfuric acid were to be produced as a copper-smelting byproduct. The refined output of cathode copper was to run about 98% to 99% pure metal. Gold and silver were also to be recovered.

The smelter is part of the Sar Cheshmeh copper complex. About 2.5 million tons of ore has been removed from the deposit since it was first opened in 1978. Rated capacity of the mine was reported to be 145,000 tons of copper per year.

During the 1982-83 winter months, smelter production of blister copper outran the refinery's capability to produce pure metal, and the smelter was shut down. Stockpiled blister copper continued to supply needed material for the refinery.

Iron and Steel.—The steel facility of the National Iranian Steel Industries Corp. at Ahwaz in west-central Iran was back in limited operation during the latter part of the year. Heavy repairs on many parts of the facility had been accomplished and future expansion plans were under consideration. Imports of 1 million tons of iron and steel materials were double those of a year earlier. Bids were to be submitted early in 1983 for a 3.2-million-ton-per-year direct-reduction plant to be added to existing steelmaking facilities at Esfahan. Steel production from this plant in 1982 was about 1,900 tons. Natural gas, to replace about 300 tons of liquefied natural gas used per year in the Esfahan plant, was to be pipelined to the facility via a 60-kilometer-

long pipeline from an existing gas transmission system.

NONMETALS

Barite.—At the barite mining operations, about 30 kilometers west of Aradkn, barite crystals were uncovered and carefully separated and stored away from the excavated barite ore. Barite crystals find wide use in medicinal applications and had previously been imported. Because of decreased oil well-drilling activity, demand for barium additives was off and this commodity was being stockpiled at the mines.

Cement.—Total cement production capacity was between 14 and 16 million tons, but about 9.5 million tons was produced in 1982, owing primarily to market conditions and various problems at the cement plants, including lack of spare parts for machinery. Cembureau, the European Cement Association, listed 18 plants in Iran, but information about their present status was not available. The Iranian Ministry of Industry indicated during the summer that production would top 10 million tons in the next year and should continue upward in the future.

MINERAL FUELS

Natural Gas.—Production of most natural gas in Iran continued to be from associated gas from existing oil wells, primarily because drilling and development for either oil or gas was very limited. As crude oil production rose somewhat during the course of the year, so did natural gas output. Iran's gas reserves were estimated at 485 trillion cubic feet and were second only to those of the U.S.S.R.; almost 20% of the world's gas reserves.

At Kangan, about 700 kilometers south of Tehran on the Persian Gulf, an organization known as Kangan Liquefied Natural Gas was engineering a 400,000-cubic-foot-per-day liquefaction unit to be built by Mitsubishi Heavy Industries Ltd. for completion late in 1983. Presumably, gas would come from several gasfields in the area including the offshore Pars Field and the Kangan onshore gas reservoir.

In September, Turkey announced that it had signed an agreement to build a pipeline from Iranian gasfields that would have sufficient capacity to meet Turkey's entire requirements. Source of this gas apparently was to be fields formerly dedicated to other country customers, some of which refused to pay Iran's asking price of $4 per thousand cubic feet of gas.

Petrochemicals.—The $3.5 to $4.2 billion[2] Iran-Japan petrochemical complex at Bandar Khomeini remained inoperable. The complex was being developed by the Iran-Japan Petrochemical Co. Ltd. representing the Mitsui-Aka International Development Corp. for Japan and the National Petrochemical Co. of Iran. It had been planned to use naphtha feedstocks from the Abadan refinery and make 300,000 tons of ethylene per year for use as a building block for 13 different petrochemical products from 13 different plants within the complex. The Japanese interests held 50% of the ownership and wanted to divorce themselves from further participation in the project on the grounds that the plant, even if rebuilt, would no longer be a commercially feasible project. Depressed markets and oversupply of petrochemicals were also cited as reasons for the disinterest. Nevertheless, the Japanese group offered to furnish technical assistance in the event reconstruction took place. There were indications during the year that scaling down the size of the project might solve some of its commercial problems, and also, that should the Japanese succeed in divesting themselves of their interests, other nations would then be invited to participate.

A new 270-ton urea fertilizer reactor was installed in the petrochemical plant at Shiraz, increasing its output by tenfold. The new facility produced at a rate of 1,500 tons of urea and 750 tons of ammonium nitrate per day. Work was being accomplished entirely by Iranian nationals.

Petroleum.—*Production.*—The proven crude oil reserves of Iran in 1982 were 57 billion barrels, which was 8.5% of the entire world's reserves. In 1982, Iran was fourth among world oil nations in reserves[3] and the country produced about 2.5% of the world's crude supply. Average output was 1,981,000 barrel per day. In January, production averaged 1,100,000 barrels per day, but in nearly every month throughout the year there were increases, culminating in a December production of 2,800,000 barrels per day.

There was little to indicate that an active drilling or development program was being undertaken. Of eight drilling rigs known to be in the country, only three were thought to be in operating order.

Refining.—Refineries, as well as many other oil installations, continued to sustain damage owing to military action.

Despite huge losses of refining capacity, petroleum product supplies were sufficient to permit lifting of rationing of home heating oil. Kerosine and gasoline supplies were increased. Discussions were underway during the year with a view to possibly building a replacement for the Abadan refinery at a different site.

A new refinery was under consideration by the Oil Ministry for future construction near Malayer-Sarband in central Iran. The site would eliminate fuel supply problems in the area.

The People's Democratic Republic of Yemen and Iran signed an agreement at midyear under which about 50,000 barrels per day of Iranian crude oil would be refined in the 175,000-barrel-per-day Aden Refinery Co. plant at Little Aden. Iran was also to sell Yemen an additional 10,000 barrels of crude per day for its own use at an attractive price.

Uranium.—Several sources of information provide sketchy reports of the discovery of uranium in Iran. Reports form OPEC in Vienna indicated that Iran planned either to build a new nuclear powerplant or seek completion of the Bushehr plant located on the Persian Gulf coast, work on which was suspended in January 1979, when the plant was 80% complete. It had been mothballed since that date. If reactivated, output would eventually be 1,200 megawatts in each of two plants. Should a new plant be constructed, very early planning called for the first stage of the work, research, to take 2 years. During the following stage, a test reactor would be built and this would then lead to the building of a nuclear powerplant. Time to complete the overall project was not divulged.[4]

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Iranian rials (Rls) to U.S. dollars at the rate of Rls83.43=US$1.00.

[3]American Petroleum Institute. Basic Petroleum Data Book. V. 3, No. 2, May 1983, Sec. 13, Table 7c.

[4]American Metal Market. Oct. 21, 1982, p. 6.
Washington Times. Oct. 20, 1982, p. 7a.

The Mineral Industry of Iraq

By George A. Morgan[1]

The mining sector, dominated by crude oil production, experienced a decline in 1982 owing to war-related damage to transportation facilities and to production facilities. Lower world oil prices reduced Government revenues further. The nonfuels sector was an insignificant portion of the gross national product of $32.1 billion in 1981, the latest year for which reliable statistics were available.[2]

The attempt to maintain an expanding domestic economy while engaged in war with Iran was strained with reports of shortages of some foodstuffs. The 1981-85 5-year plan initially envisaged an investment budget of $135 billion, but this has since been redirected to affect completion of ongoing projects.

Further indication of financing difficulties was the decline in foreign reserves from about $25 billion prior to the war to about $6 billion at yearend 1982. The cost of imports has continued to increase to meet the needs of the expanding domestic economy. Reduced revenues from declining exports were made up by long-term loans at no interest from Saudi Arabia, Kuwait, and other countries.[3]

GOVERNMENT POLICIES AND PROGRAMS

The Government controlled the economy through complete ownership of the principal producing sectors, mainly petroleum. Austerity measures were instituted in 1982 as a reaction to the loss of exports. Among these were a 5% devaluation of the Iraqi dinar, which reduced the drain from foreign worker remittance, estimated at $4 billion per year. Hard currency conversion by contract foreign workers were reduced to 50% from 75% of salary earned. Remittances were also reduced to an estimated 1 million foreigners in the private sector, who were treated separately from contract workers.

A revised industrial investment law was passed in December 1982. The law encouraged private and mixed investment by raising the level of money available for investment and by expanded tax benefits. Collectivization programs have been abolished.

PRODUCTION AND TRADE

Petroleum output declined from 3.4 million barrels per day in 1980 to 850,000 barrels per day at yearend 1982. Oil exports accounted for $10.4 billion of total exports of $11.6 billion in 1981, compared with $26.1 billion for oil exports in 1980. Oil exports were adversely affected by the destruction of the major terminals at Mina al-Bakr and Khor al-Amaya in the south and the closure of two pipelines through Syria in April 1982. The two pipelines transversing Syria had capacities of 300,000 barrels and 400,000 barrels per day The principal means of transport was via a single pipeline through Turkey. Rail and road transport facilities were expanding rapidly to make up for the loss of port facilities.

Table 1.—Iraq: Production of mineral commodities[1]

Commodity[2]		1978	1979	1980	1981[p]	1982[e]
METALS						
Iron and steel:						
Sponge iron	metric tons	40,000	280,000	210,000	40,000	40,000
Crude steel	do	50,000	352,000	260,000	45,000	45,000
NONMETALS						
Cement, hydraulic	thousand metric tons	4,600	5,100	5,500	5,600	5,600
Gypsum[e]	do	160	165	170	170	170
Nitrogen:						
N content of ammonia	do	181	450	500	80	80
N content of urea	do	100	250	300	50	50
Salt	do	82	90	90	80	80
Sulfur, elemental:						
Native, Frasch	do	600	550	700	145	100
Byproduct[e]	do	40	[r]40	40	40	40
Total	do	640	[r]590	740	185	140
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic feet	388,460	560,000	430,000	401,173	400,000
Marketed[3]	do	60,035	78,751	79,000	62,154	60,000
Natural gas liquids:						
Natural gasoline	thousand 42-gallon barrels	[e]1,250	1,250	[e]250	400	400
Propane and butane	do	[e]3,000	3,000	[e]3,000	990	1,000
Petroleum and refinery products:						
Crude	do	953,130	1,252,000	968,582	326,000	310,000
Refinery products:						
Gasoline	do	12,254	9,900	10,000	NA	NA
Jet fuel	do	1,935	2,310	3,000	NA	NA
Kerosine	do	5,160	NA	NA	NA	NA
Distillate fuel oil	do	12,899	15,180	17,000	NA	NA
Residual fuel oil	do	14,189	16,830	18,500	NA	NA
Lubricants	do	580	330	400	NA	NA
Other	do	13,609	9,900	10,000	NA	NA
Refinery fuel and losses	do	3,870	6,600	8,100	NA	NA
Total	do	64,496	61,050	67,000	20,000	20,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through June 14, 1983.

[2]In addition to the commodities listed, lime and a variety of crude construction materials (clays, stone, and sand and gravel) are also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels. In addition, limited unreported quantities of phosphate rock may have been produced for test purposes prior to inauguration of commercial production at the Al Kain chemical complex.

[3]Includes reinjected, if any.

COMMODITY REVIEW

METALS

There was no significant activity in the metals sector, which consisted mainly of iron and steel production. Although expansion of the steelworks at Khor Al Zubair was in the planning, it remained practically inoperative owing to its proximity to the war zone.

NONMETALS

Cement.—Kawasaki Heavy Industries (Japan) headed construction of a 1-million-ton-per-year plant at Hit, 90 kilometers west of Baghdad, with startup planned for 1983. A 1-million-ton-per-year extension of the plant at Badoosh was underway. A 2-million-ton-per-year plant was also planned for the southwest at Samawa.

Sulfur.—The Al Kain sulfuric acid plant, with an annual capacity of 1.8 million tons per year of sulfuric acid, went into operation. Sulfur was supplied from the Mishraq Mine near Mosul. Phosphate for the fertilizer plant at Al Kain was to be from the Akashat Mine about 150 kilometers to the southwest.

MINERAL FUELS

Natural Gas.—Iraq continued to flare about 85% of its natural gas production, which was mainly associated gas. Projects to absorb the unused gas were slow in coming to fruition.

Petroleum.—Proven oil reserves were reported at 59 billion barrels, and an additional 46 billion barrels were estimated reserves. Production was about 25% of prewar levels of 3.4 million barrels per day.

Export facilities have been reduced to a

single 980-kilometer-long pipeline through Turkey with a capacity of about 650,000 barrels per day. A 45% to 50% increase in the pipeline's capacity was planned for completion by midyear 1984. Other pipelines were also considered for construction across Saudi Arabia and Kuwait.

Refining.—Refining capacity prior to the war was about 300,000 barrels per day from plants at Basra, 150,000 barrels per day; Daura, 80,000 barrels per day; and several small topping plants at Kirkuk, Baiji, and Samarra. Basra was extensively damaged early in the war. However, several 10,000-barrel-per-day topping plants have been installed in various parts of the country, and the first phase of the new refinery at Baiji was in operation with a capacity of 70,000 barrels per day.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Iraqi dinars (ID) to U.S. dollars at the rate of ID0.320=US$1.00.

[3]U.S. interests, Baghdad. Airgram 601, Feb. 2, 1983, 14 pp.

The Mineral Industry of Ireland

By Tatiana Karpinsky[1]

Ireland continued to suffer from economic stagnation and rising unemployment. The gross national product declined by about 1% in 1982, after increases of about 1% in each of the two previous years. Industrial production increased 1%. By the end of 1982, unemployment increased to over 13% of the labor force. It was also a bad year for the mining and mineral industry. Mining operations lost over $3.6 million.[2] Four mines were closed down, leaving only seven still in operation. Three of the fifteen exploration companies ceased operations. Ireland's largest remaining mine was recovering from labor troubles. Foreign companies, which accounted for most of the prospecting and mining activity, were continuing scaled-down exploration and found numerous small deposits, primarily of zinc-lead and copper, together with promising lithium, talc, and magnesite occurrences. The overall number of exploration licenses declined from 924 in 1974 to 600 in 1982. The mining sector employed over 2,000 people with an additional 3,500 active in quarrying.

PRODUCTION

The year was notable for the heavy cutbacks of copper production caused by the poor market and uneconomic price level. The 1981 strike at the major lead-zinc operation, Tara Mines Ltd.'s Novan Mine, held down the level of lead-zinc production. Barite production declined following the recent closures of Milchem Minerals Ltd.'s Lady's Well Mine in County Cork and Tynagh Mine, County Galway.

Ballynoe open pit mine, County Tipperary, was the only remaining barite producer. The severe cutback in the construction industry, which was likely to become more acute, curtailed the production of cement and gypsum.

Offshore drilling was low and uneventful as only four dry wells were sunk off the west coast in the Porcupine Basin.

Table 1.—Ireland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
METALS					
Copper, mine output, metal content	4,800	4,900	4,200	3,500	1,600
Iron and steel: Steel, crude thousand tons	69	72	2	32	55
Lead, mine output, metal content	47,800	71,000	59,000	30,500	36,200
Silver, mine output, metal content thousand troy ounces	631	1,059	771	596	352
Zinc, mine output, metal content	176,000	212,300	228,700	120,300	167,200
NONMETALS					
Barite	349,000	328,300	259,947	273,900	265,800
Cement, hydraulic thousand tons	1,806	2,067	1,868	1,938	1,619

See footnotes at end of table.

Table 1.—Ireland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Gypsum thousand tons	392	417	382	359	371
Lime	92,000	73,000	31,700	46,100	46,500
Nitrogen: N content of ammonia thousand tons	24	171	254	291	[e]250
Pyrites	42,000	29,354	25,000	25,600	13,800
Sand and gravel[3] thousand tons	5,726	7,168	5,376	5,400	6,497
Stone and other quarry products:					
Limestone[3] do	11,147	11,101	11,945	9,721	11,831
Other[3 4] do	3,396	3,882	3,694	3,040	3,126
Sulfur: S content of pyrites	18,900	13,050	11,250	[e]11,250	[e]11,250
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite and bituminous thousand tons	31	62	63	70	63
Coke, gashouse including breeze do	NA	41	40	[e]40	[e]40
Gas, natural: Marketed million cubic feet	NA	NA	32,205	49,087	72,324
Peat:					
For agricultural use thousand tons	82	91	88	81	95
For fuel use:					
Sod peat[5] do	1,974	1,653	1,688	1,584	1,680
Milled peat[6] do	2,630	2,013	2,738	3,774	3,599
Total do	4,604	3,666	4,426	5,358	5,279
Peat briquets[7] do	334	325	338	340	406
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	4,508	4,412	4,152	1,589	960
Jet fuel do	98	252	155	60	NA
Distillate fuel oil do	4,821	4,566	4,019	1,418	1,084
Residual fuel oil do	6,388	7,075	5,981	2,200	1,308
Liquefied petroleum gas do	719	260	238	211	155
Naphtha do	121	126	35	14	3
Refinery fuel and losses do	206	574	408	NA	NA
Total do	16,861	17,265	14,988	5,492	3,510

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through Oct. 3, 1983.

[2]In addition to the commodities listed, substantial quantities of stone and sand and gravel are produced by local authorities and road contractors. Ireland also produces significant quantities of manufactured diamond, but output is not quantitatively reported, and available general information is inadequate to make reliable estimates of output levels.

[3]Excludes output by local authorities.

[4]Figures given, as officially reported, include granite, marble, silica, rock, sand, calcspar, fire clay, and slate and clays for cement production.

[5]Includes production by farmers and by Bord Na Mona.

[6]Includes milled peat used for briquet production.

[7]Produced from milled peat.

TRADE

The Irish economy continued to depend on imports of nonferrous metals, fuels, iron, steel, and fertilizers. Metal concentrates were exported to smelters in the United Kingdom and on the European Continent. Mineral exports earned over $108 million or 2.5% of Ireland's total exports. U.S. mineral imports from Ireland were largely nonmetallics, such as barite and manufactured industrial diamonds; U.S. mineral exports to Ireland consisted of superphosphate, bituminous coal, petroleum products, and nonferrous metals.

Table 2.—Ireland: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	10	23	--	All to United Kingdom.
Aluminum:				
Oxides and hydroxides	1,543	1,925	--	United Kingdom 698; Thailand 344; France 245.
Metal including alloys:				
Scrap	3,526	2,365	--	United Kingdom 1,235; Netherlands 603; Belgium-Luxembourg 470.
Unwrought	2,206	2,173	--	United Kingdom 1,736; West Germany 280; Japan 72.
Semimanufactures	2,495	2,140	77	United Kingdom 1,376; West Germany 455; Greece 46.
Chromium: Oxides and hydroxides	10	--		
Copper:				
Ore and concentrate	18,888	17,525	--	West Germany 8,440; Finland 5,485; East Germany 2,083.
Matte and speiss including cement copper	--	(1)	--	All to United Kingdom.
Metal including alloys:				
Scrap	6,698	7,119	--	Belgium-Luxembourg 2,104; United Kingdom 1,813; Netherlands 1,506.
Unwrought	454	759	(1)	Belgium-Luxembourg 333; West Germany 184; United Kingdom 142.
Semimanufactures	1,807	2,122	534	United Kingdom 781; U.S.S.R. 281; Belgium-Luxembourg 231.
Iron and steel:				
Iron ore and concentrate, pyrite, roasted	27,092	17,296	--	All to United Kingdom.
Metal:				
Scrap	84,458	73,307	--	Spain 46,515; United Kingdom 22,666; West Germany 2,803.
Pig iron, cast iron, related materials	178	114	--	United Kingdom 93; West Germany 8; Switzerland 8.
Ferroalloys:				
Ferromanganese	121	50	--	United Kingdom 31; West Germany 19.
Unspecified	21	11	--	Mainly to United Kingdom.
Steel, primary forms	1,813	791	--	United Kingdom 547; Trinidad and Tobago 64; Belgium-Luxembourg 56.
Semimanufactures:				
Bars, rods, angles, shapes, sections	18,636	18,955	(1)	United Kingdom 14,638; West Germany 3,031; Italy 1,098.
Universals, plates, sheets	6,145	7,668	--	United Kingdom 7,040; West Germany 490; Trinidad and Tobago 67.
Hoop and strip	830	603	17	United Kingdom 319; India 77; Italy 55.
Rails and accessories	1,157	131	--	United Kingdom 128; West Germany 2.
Wire	937	483	1	United Kingdom 326; West Germany 87; Finland 18.
Tubes, pipes, fittings	6,736	7,074	(1)	United Kingdom 3,801; West Germany 1,610; Netherlands 443.
Castings and forgings, rough	42	100	--	United Kingdom 88; West Germany 8.
Lead:				
Ore and concentrate	110,238	63,779	--	France 17,669; West Germany 14,430; Spain 11,288.
Oxides	25	42	--	Sweden 25; United Kingdom 17.
Metal including alloys:				
Scrap	1,881	2,226	--	Netherlands 798; United Kingdom 717; Denmark 278.
Unwrought	1,857	3,612	(1)	United Kingdom 2,198; Netherlands 881; Belgium-Luxembourg 303.
Semimanufactures	2,419	2,554	61	United Kingdom 1,716; Netherlands 736; Belgium-Luxembourg 23.
Magnesium: Metal including alloys:				
Scrap	53	15	--	Netherlands 13; United Kingdom 2.
Unwrought	5	15	--	France 14.
Manganese: Oxides	12,374	9,954	344	Singapore 1,638; Nigeria 1,345; U.S.S.R. 1,170.
Mercury 76-pound flasks	64	638	--	All to United Kingdom.
Metalloids: Unspecified	1	41	--	Mainly to United Kingdom.

See footnotes at end of table.

Table 2.—Ireland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss	4	--		
Metal including alloys:				
Scrap	95	85	--	United Kingdom 83; West Germany 1.
Unwrought	2	75	--	Mainly to West Germany.
Semimanufactures	238	195	--	Switzerland 85; West Germany 48; United Kingdom 32.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified troy ounces	r46,490	19,066	--	All to United Kingdom.
Silver:				
Waste and sweepings[2] value, thousands	$2,132	$978	$5	United Kingdom $727; West Germany $231.
Metal including alloys, unwrought and partly wrought troy ounces	105,294	160,369	--	United Kingdom 45,687.
Tin: Metal including alloys:				
Scrap	285	163	--	All to United Kingdom.
Unwrought	--	2	--	All to West Germany.
Semimanufactures	137	23	18	United Kingdom 5.
Titanium: Oxides	21	64	--	All to United Kingdom.
Tungsten: Metal including alloys, unwrought	3	4	--	United Kingdom 3; Libya 1.
Zinc:				
Ore and concentrate	462,096	254,132	--	Belgium-Luxembourg 99,135; West Germany 33,806; France 23,860.
Oxides	39	58	4	United Kingdom 53; Greece 1.
Metal including alloys:				
Scrap	176	114	--	India 35; United Kingdom 35; Spain 17.
Unwrought	3,601	451	--	United Kingdom 430; Belgium-Luxembourg 20.
Semimanufactures	11	114	39	Brazil 50; United Kingdom 23.
Other:				
Oxides and hydroxides	38	31	--	United Kingdom 29.
Ashes and residues	1,350	948	63	Belgium-Luxembourg 326; United Kingdom 317; Italy 242.
Base metals including alloys, all forms	309	160	34	West Germany 60; Belgium-Luxembourg 34; United Kingdom 29.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	53	6	--	Mainly to United Kingdom.
Artificial: Corundum	14	1	--	All to Switzerland.
Grinding and polishing wheels and stones	94	35	8	United Kingdom 18; West Germany 3; Singapore 2.
Asbestos, crude	120	20	--	All to United Kingdom.
Barite and witherite	272,643	260,691	82,950	United Kingdom 72,930; Republic of South Africa 30,450; Norway 19,384.
Boron materials:				
Crude natural borates	15	--		
Oxides and acids	--	(1)	--	All to United Kingdom.
Cement	96,640	130,826	--	United Kingdom 130,718.
Chalk	11	--		
Clays and clay products:				
Crude, unspecified	154	834	--	United Kingdom 800; Japan 3.
Products:				
Nonrefractory	719	789	(1)	United Kingdom 753; Norway 35.
Refractory including nonclay brick	62,735	61,662	--	United Kingdom 18,359; West Germany 15,262; Belgium-Luxembourg 7,799.
Diamond:				
Gem, not set or strung value, thousands	$59	$16	--	All to Israel.
Industrial carats	6,912	--		
Fertilizer materials:				
Crude, n.e.s	1,788	2,828	--	All to United Kingdom.
Manufactured:				
Ammonia	70,376	34,423	--	United Kingdom 18,523; Spain 7,037; Portugal 4,373.
Nitrogenous	64,548	149,017	--	United Kingdom 48,449; Belgium-Luxembourg 31,940; France 23,490.
Phosphatic	74	5	--	All to United Kingdom.
Potassic	221	3,108	--	Do.
Unspecified and mixed	36,084	82,161	--	Do.

See footnotes at end of table.

Table 2.—Ireland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Graphite, natural	166	61	--	All to United Kingdom.
Gypsum and plaster	57,816	39,992	--	United Kingdom 39,990; France 2.
Halogens:				
Chlorine	344	115	--	All to United Kingdom.
Unspecified	58	19	--	Do.
Lime	1,363	193	--	United Kingdom 192; Netherlands 1.
Magnesium compounds: Other	73,395	77,361	37,035	United Kingdom 15,172; Belgium-Luxembourg 8,882; Austria 6,990.
Mica:				
Crude including splittings and waste	32	--		
Worked including agglomerated splittings	5	(1)	--	All to United Kingdom.
Nitrates, crude	72	177	--	Do.
Phosphates, crude	97	486	--	Do.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$420	$122	--	United Kingdom $73; Switzerland $43.
Synthetic do.	--	$5	$5	
Salt and brine	689	182	--	United Kingdom 156; Sweden 25.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1	3	--	All to United Kingdom.
Sodium carbonate, natural and manufactured	2	47	--	Do.
Sodium hydroxide	98	490	--	United Kingdom 486.
Sodium sulfate, natural and manufactured	67	49	NA	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,378	3,428	120	United Kingdom 3,286; Italy 1.
Worked	752	1,106	384	United Kingdom 669; Netherlands 19; Italy 10.
Dolomite, chiefly refractory-grade	25	3	--	All to United Kingdom.
Gravel and crushed rock	168,318	221,485	--	United Kingdom 165,933; West Germany 40,360; France 15,192.
Limestone other than dimension	231	1,203	--	All to United Kingdom.
Quartz and quartzite	286	374	--	United Kingdom 298; Netherlands 76.
Sand other than metal-bearing	6,995	5,235	--	United Kingdom 5,113.
Sulfur:				
Elemental:				
Crude including native and byproduct	25	105	--	All to United Kingdom.
Colloidal, precipitated, sublimed kilograms	100	--		
Sulfuric acid	2,729	8,176	--	Netherlands 6,995; Belgium-Luxembourg 991; United Kingdom 189.
Talc, steatite, soapstone, pyrophyllite	35	64	--	Netherlands 41; United Kingdom 22.
Other:				
Crude	19	119	19	United Kingdom 74; Colombia 20.
Slag and dross, not metal-bearing	19	16	--	All to United Kingdom.
Oxides and hydroxides of barium, magnesium, strontium	263	497	--	France 180; United Kingdom 138; Thailand 78.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	8,332	8,297	--	United Kingdom 4,685; Nigeria 3,162; Hong Kong 371.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	27	239	--	All to United Kingdom.
Carbon: Carbon black	630	805	3	Netherlands 611; United Kingdom 182.
Coal:				
Anthracite	795	221	--	All to United Kingdom.
Bituminous	37,651	9,014	--	Finland 5,224; United Kingdom 3,286.
Lignite including briquets	4	--		

See footnotes at end of table.

Table 2.—Ireland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	8,719	2,247	--	Sweden 2,027; United Kingdom 220.
Gas, manufactured	18	75	--	United Kingdom 74.
Hydrogen, helium, rare gases	819	1,011	--	United Kingdom 992; Netherlands 17.
Peat including briquets and litter	129,826	131,682	--	United Kingdom 118,965; Egypt 7,448; France 3,087.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	20,648	40,008	--	All to United Kingdom.
Gasoline do	23,672	5,432	--	Do.
Mineral jelly and wax do	1,204	1,464	--	United Kingdom 795; Netherlands 346.
Distillate fuel oil do	70,863	56,099	--	United Kingdom 55,935; Yugoslavia 164.
Lubricants do	1,289,071	951,741	--	United Kingdom 505,001; Netherlands 132,482; Belgium-Luxembourg 127,386.
Residual fuel oil do	66,773	326	--	United Kingdom 180; France 133.
Bitumen and other residues do	558	91	--	All to United Kingdom.
Bituminous mixtures do	139	3,036	--	Do.
Tars and other crude chemicals derived from coal, gas, and petroleum	144	11,282	--	Do.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.

Table 3.—Ireland: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	71	14	1	United Kingdom 10; West Germany 3.
Aluminum:				
Ore and concentrate	3	24	--	France 21; United Kingdom 3.
Oxides and hydroxides	3,998	4,289	195	United Kingdom 3,680; France 279; Netherlands 120.
Metal including alloys:				
Scrap	116	407	--	United Kingdom 350; Canada 54.
Unwrought	5,486	2,522	--	United Kingdom 1,801; France 617; West Germany 84.
Semimanufactures	19,050	18,957	589	United Kingdom 9,230; West Germany 3,250; France 2,234.
Beryllium: Metal including alloys, all forms value, thousands	$5	--		
Chromium:				
Ore and concentrate	1	5,623	--	All from Republic of South Africa.
Oxides and hydroxides	119	89	(1)	West Germany 37; Italy 37; United Kingdom 15.
Cobalt: Oxides and hydroxides	10	3	2	West Germany 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$35	$6	$5	NA.
Copper:				
Ore and concentrate	2	--		
Matte and speiss including cement copper	1	1	--	All from United Kingdom.
Metal including alloys:				
Scrap	121	280	--	United Kingdom 255; Netherlands 25.
Unwrought	197	215	--	United Kingdom 188; West Germany 26.
Semimanufactures	17,852	17,561	280	United Kingdom 10,805; Belgium-Luxembourg 2,426; West Germany 1,202.

See footnotes at end of table.

Table 3.—Ireland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	36	38	--	All from United Kingdom.
Metal:				
Scrap	7,926	3,846	4	United Kingdom 3,783; West Germany 39; Italy 16.
Pig iron, cast iron, related materials	2,325	1,906	2	United Kingdom 1,072; Belgium-Luxembourg 393; West Germany 149.
Ferroalloys:				
Ferromanganese	291	674	--	Norway 400; United Kingdom 176; France 58.
Ferrosilicon	203	297	--	NA.
Unspecified	157	67	--	NA.
Steel, primary forms	18,538	13,510	66	United Kingdom 6,190; France 5,264; West Germany 712.
Semimanufactures:				
Bars, rods, angles, shapes, sections	152,143	180,482	146	United Kingdom 117,184; France 17,387; Belgium-Luxembourg 11,374.
Universals, plates, sheets	133,392	154,124	146	United Kingdom 77,171; Netherlands 18,651; West Germany 15,651.
Hoop and strip	16,766	17,637	182	United Kingdom 8,555; West Germany 6,901; Belgium-Luxembourg 1,547.
Rails and accessories	11,810	10,893	--	West Germany 7,080; United Kingdom 3,703; Belgium-Luxembourg 91.
Wire	14,398	14,271	42	United Kingdom 7,532; France 2,576; West Germany 1,675.
Tubes, pipes, fittings	59,599	61,950	508	United Kingdom 21,259; West Germany 14,030; Italy 8,038.
Castings and forgings, rough	4,325	3,580	73	United Kingdom 1,233; Italy 1,008; West Germany 608.
Lead:				
Oxides	2,350	2,497	--	United Kingdom 2,456; West Germany 40.
Metal including alloys:				
Scrap	4,203	7,455	--	United Kingdom 5,173; Netherlands 2,140; Belgium-Luxembourg 102.
Unwrought	3,352	1,389	--	United Kingdom 1,140; Netherlands 161; Belgium-Luxembourg 82.
Semimanufactures	2,269	1,481	31	United Kingdom 1,285; Netherlands 131; France 13.
Magnesium: Metal including alloys:				
Scrap	5	--		
Unwrought	111	53	1	Norway 40; United Kingdom 12.
Semimanufactures	89	133	(1)	United Kingdom 102; West Germany 30.
Manganese:				
Ore and concentrate, metallurgical-grade	32,391	16,103	--	Ghana 15,646; Brazil 301; United Kingdom 92.
Oxides	281	492	3	United Kingdom 409; Belgium-Luxembourg 37; Netherlands 24.
Mercury 76-pound flasks	220	87	--	United Kingdom 58.
Metalloids: Unspecified	166	178	3	United Kingdom 114; France 36; Italy 19.
Molybdenum: Metal including alloys, all forms value, thousands	$72	$42	--	United Kingdom $41; Australia $1.

See footnotes at end of table.

Table 3.—Ireland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss	11	14	7	United Kingdom 7.
Metal including alloys:				
Scrap	(1)	20	--	All from United Kingdom.
Unwrought	254	188	9	U.S.S.R. 74; France 51; Switzerland 30.
Semimanufactures	321	256	59	United Kingdom 115; West Germany 56; Austria 9.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified troy ounces	30,061	17,747	NA	United Kingdom 11,189.
Silver:				
Waste and sweepings[2] value, thousands	$387	$47	--	All from United Kingdom.
Metal including alloys, unwrought and partly wrought troy ounces	702,043	602,413	326,461	United Kingdom 250,778.
Tin: Metal including alloys:				
Scrap	3	1	--	All from United Kingdom.
Unwrought	22	21	--	United Kingdom 12; West Germany 9.
Semimanufactures	823	119	21	United Kingdom 72; West Germany 24.
Titanium: Oxides	2,800	3,655	(1)	United Kingdom 1,433; France 740; Norway 710.
Tungsten: Metal including alloys, all forms	4	4	3	United Kingdom 1.
Uranium and/or thorium: Ore and concentrate	3	--		
Zinc:				
Ore and concentrate	(1)	(1)	NA	NA.
Oxides	1,003	1,000	9	United Kingdom 820; West Germany 67; Netherlands 41.
Metal including alloys:				
Scrap	205	365	--	All from United Kingdom.
Unwrought	2,349	2,098	--	United Kingdom 694; Belgium-Luxembourg 499; Canada 390.
Semimanufactures	638	1,179	(1)	United Kingdom 863; Belgium-Luxembourg 172; West Germany 41.
Other:				
Ores and concentrates	46	40	--	United Kingdom 23; Spain 16.
Oxides and hydroxides	576	476	10	United Kingdom 264; Netherlands 165; West Germany 34.
Ashes and residues	1,156	2,160	--	Netherlands 1,900; Belgium-Luxembourg 170; United Kingdom 90.
Base metals including alloys, all forms	238	191	120	United Kingdom 36; West Germany 31; Japan 2.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	383	416	2	United Kingdom 397; West Germany 13.
Artificial: Corundum	82	34	--	Netherlands 20; United Kingdom 14.
Dust and powder of precious and semi-precious stones including diamond kilograms	46	93	93	
Grinding and polishing wheels and stones	764	616	40	West Germany 200; United Kingdom 180; Austria 69.
Asbestos, crude	8,413	6,173	2	Canada 2,904; Cyprus 1,865; Republic of South Africa 1,300.
Barite and witherite	717	319	--	United Kingdom 199; West Germany 100; China 20.
Boron materials:				
Crude natural borates	1,207	958	169	Netherlands 758; United Kingdom 40.
Oxides and acids	158	200	--	France 159; United Kingdom 40.
Cement	256,817	52,811	39	Netherlands 20,999; United Kingdom 14,572; Spain 12,048.
Chalk	5,282	3,526	(1)	United Kingdom 3,335; West Germany 129; China 40.

See footnotes at end of table.

Table 3.—Ireland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude, unspecified	30,677	32,694	221	United Kingdom 23,258; Spain 6,910; France 1,041.
Products:				
Nonrefractory	60,979	70,733	(1)	United Kingdom 57,862; Italy 7,548; Spain 2,799.
Refractory including nonclay brick	19,810	11,868	13	United Kingdom 9,572; West Germany 1,343; Austria 447.
Cryolite and chiolite	1	(1)	--	All from United Kingdom.
Diamond:				
Gem, not set or strung value, thousands	$222	$110	--	United Kingdom $75; Israel $35.
Industrial carats	20,000	25,000	--	Mainly from Switzerland.
Diatomite and other infusorial earth	712	472	363	United Kingdom 108.
Feldspar, fluorspar, related materials:				
Unspecified	6,106	5,856	--	Norway 4,911; United Kingdom 531; Republic of South Africa 414.
Fertilizer materials:				
Crude, n.e.s	1,771	2,863	--	All from United Kingdom.
Manufactured:				
Ammonia	28,960	20,212	--	United Kingdom 19,390; Netherlands 702.
Nitrogenous	178,120	133,812	10	Belgium-Luxembourg 46,321; Netherlands 37,749; West Germany 29,952.
Phosphatic	71,813	142,260	48,311	Sweden 26,479; Tunisia 17,130; France 14,120.
Potassic	272,412	319,786	40	West Germany 186,396; East Germany 52,614; France 35,827.
Unspecified and mixed	311,253	341,074	69,994	United Kingdom 144,910; France 59,745; Belgium-Luxembourg 21,140.
Graphite, natural	14	64	3	United Kingdom 60.
Gypsum and plaster	4,711	14,163	228	France 8,038; United Kingdom 5,606; West Germany 206.
Halogens:				
Chlorine	1,652	1,211	--	All from United Kingdom.
Unspecified	371	70	1	United Kingdom 47; Japan 19.
Lime	2,284	1,811	--	United Kingdom 1,580; West Germany 189.
Magnesium compounds: Other	32,116	19,816	--	China 9,437; Spain 5,185; United Kingdom 5,082.
Mica:				
Crude including splittings and waste	358	313	34	United Kingdom 270; West Germany 5.
Worked including agglomerated splittings	42	172	168	United Kingdom 4.
Phosphates, crude	87,059	36,858	--	Morocco 33,712; West Germany 2,580.
Pigments, mineral: Iron oxides and hydroxides, processed	1,716	2,216	1	West Germany 1,892; United Kingdom 200; Spain 105.
Potassium salts, crude	80	37	--	All from United Kingdom.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$740	$135	--	United Kingdom $129; India $5.
Synthetic do.	$76	$86	$79	Switzerland $3; Austria $2; France $2.
Pyrite, unroasted	16	1,686	--	Norway 1,683.
Salt and brine	87,333	74,089	9	United Kingdom 45,199; West Germany 16,139; Spain 8,160.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	677	1,305	--	United Kingdom 599; France 460; West Germany 64.
Sodium carbonate, natural and manufactured	5,097	7,473	6	United Kingdom 4,458; Poland 2,917; West Germany 72.
Sodium hydroxide	32,726	25,225	1	United Kingdom 23,081; Netherlands 1,533.
Sodium sulfate, natural and manufactured	877	907	NA	NA.

See footnotes at end of table.

Table 3.—Ireland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	4,312	6,253	--	Republic of South Africa 1,647; Brazil 1,511; India 1,314.
Worked	3,591	4,023	1	Italy 2,159; France 863; United Kingdom 780.
Dolomite, chiefly refractory-grade	226	1,386	--	France 1,090; United Kingdom 215; Norway 50.
Gravel and crushed rock	444,292	351,166	--	United Kingdom 349,529; France 1,299; Italy 247.
Limestone other than dimension	4,240	3,563	19	United Kingdom 3,544.
Quartz and quartzite	470	387	2	Portugal 242; United Kingdom 79; Belgium-Luxembourg 60.
Sand other than metal-bearing	162,318	147,468	131	United Kingdom 101,672; Belgium-Luxembourg 38,503; Norway 4,913.
Sulfur:				
Elemental:				
Crude including native and byproduct	528	473	5	United Kingdom 330; West Germany 99; Belgium-Luxembourg 36.
Colloidal, precipitated, sublimed	120	89	10	All from United Kingdom.
Sulfuric acid	75,669	41,428	--	United Kingdom 26,314; Netherlands 12,996.
Talc, steatite, soapstone, pyrophyllite	2,569	2,492	1	United Kingdom 1,111; China 733; Netherlands 272.
Other:				
Crude	8,754	6,933	121	Italy 3,200; Netherlands 1,017; Republic of South Africa 1,000.
Slag and dross, not metal-bearing	1,972	5,436	--	Netherlands 4,320; Sweden 776; United Kingdom 301.
Oxides and hydroxides of barium magnesium, strontium	43	243	102	United Kingdom 134; West Germany 3.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	33,784	27,430	30	United Kingdom 13,263; Belgium-Luxembourg 5,418; France 5,398.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,372	3,538	216	United Kingdom 2,507; Antigua 484; Trinidad and Tobago 251.
Carbon: Carbon black	14,301	16,777	52	Finland 9,739; United Kingdom 5,014; Netherlands 1,461.
Coal:				
Anthracite	36,825	36,894	3,138	United Kingdom 12,789; Republic of South Africa 11,744; Netherlands 6,308.
Bituminous thousand tons	1,168	1,252	582	United Kingdom 407; Poland 184; West Germany 26.
Briquets of anthracite and bituminous coal	--	10	--	All from United Kingdom.
Lignite including briquets	--	11,889	--	East Germany 6,368; West Germany 5,444.
Coke and semicoke	8,200	7,141	1	United Kingdom 2,248; Belgium-Luxembourg 2,183; West Germany 1,752.
Gas, manufactured	9	81	--	West Germany 75; United Kingdom 5.
Hydrogen, helium, rare gases	2,659	2,761	(1)	United Kingdom 2,758; West Germany 2.
Peat including briquets and litter	323	391	--	United Kingdom 239; West Germany 110; Canada 41.

See footnotes at end of table.

Table 3.—Ireland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products:				
Crude				
thousand 42-gallon barrels	15,528	4,787	--	Saudi Arabia 3,344; Kuwait 929; United Arab Emirates 367.
Refinery products:				
Liquefied petroleum gas				
do	1,727	1,779	(1)	United Kingdom 1,500; Saudi Arabia 157; France 80.
Gasoline do	6,923	8,455	NA	United Kingdom 8,310; Sweden 143.
Mineral jell, and wax do	23	18	(1)	United Kingdom 12; West Germany 5.
Kerosine and jet fuel do	2,299	2,401	NA	United Kingdom 2,218; U.S.S.R. 176.
Distillate fuel oil do	5,959	8,075	(1)	United Kingdom 7,332; U.S.S.R. 691; Belgium-Luxembourg 37.
Lubricants do	394	387	10	United Kingdom 356; Belgium-Luxembourg 10; West Germany 4.
Residual fuel oil do	12,350	11,322	--	United Kingdom 6,960; France 2,408; Belgium-Luxembourg 883.
Bitumen and other residues do	574	864	--	United Kingdom 863.
Bituminous mixtures do	44	35	(1)	United Kingdom 34.
Petroleum coke do	3	(1)	(1)	
Tars and other crude chemicals derived from coal, gas, and petroleum	8,326	6,653	10	United Kingdom 6,595; Netherlands 18.

NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Construction of a new alumina plant on Aughinish Island in the Shannon Estuary continued. The plant was expected to come onstream in 1983.

Copper.—The 200-year-old Avoca copper mine in County Wicklow was closed. Supported by Government subsidies of approximately $14.2 million since 1974, the Irish-owned Avoca Mine ran out of profitable ore and went into receivership in August. Over 200 jobs were lost.

Iron and Steel.—Operation at the modern steel plant at the Haulbowline site near Cork continued; production was unlikely, however, to exceed 40% of capacity in the near future. While production remained low, financial charges and depreciation were high, and the state-owned company reported a loss of $30.8 million compared with $18.4 million in 1981. Irish Steel Ltd. (IS), the operator, got a $35.5 million grant from the Government in May. During the time of plant construction, other countries largely increased their sales to Ireland, and the market was supplied with steel at low prices and on extended credit terms. The Irish steel industry was designed to be export oriented because the domestic market was so small. Exports in 1981 amounted to $7.7 million and were mostly to the United Kingdom; the Belgium, Netherlands, Luxembourg Economic Union; and the Federal Republic of Germany. According to an earlier trade agreement with France's Metallurgique de Normandie, the Irish company IS started delivering steel to France, following the closure of Normandie's section mill.

Lead-Zinc.—At the beginning of 1982 the mining operations at Tara Mines' underground mine at Navan, County Meath, were resumed after a 7-month strike, and normal production of lead-zinc ore was achieved in the second quarter of the year. Daily production reached 9,400 tons of ore. The total output for the year was 1.5 million tons of ore grading 10.8% zinc and 2.2% lead. Total reserves of lead-zinc ore as of December 31, 1981, were estimated at 64.5 million tons. Owing to increasing energy costs, plans for building a zinc smelter in Ireland were canceled, and the concentrates continued to

be processed abroad.

Bula Ltd., after 6 years of negotiation, received planning permission to initiate an underground lead-zinc operation at Navan, County Meath. Among 23 conditions attached to the permit were requirements that Bula strictly limit the water level at its proposed tailings dam to reduce pollution risks to a nearby river, that the company pay for relocating a public water intake, and that Bula finance $548,000 in improvements to a country road that could be damaged by the mining operations. Plans called for Bula to mine 600,000 tons per year of ore, yielding about 120,000 tons of lead concentrate.

The Mogul of Ireland Mine at Silvermines, County Tipperary, was closed in August when reserves were depleted. A loss of $3.6 million was reported, and over 500 jobs were lost.

NONMETALS

Barite.—Milchem Minerals Ltd. ceased operations at its Clonakilty Mine in County Cork, after running out of profitable ore. The closure cost 43 jobs. Milchem Minerals also was reworking the tailings dam of the defunct Tynagh lead-zinc mine in County Galway for barite, but closed this operation until 1983.

The main producer of barite was the Ballynoe open pit mine, located near the village of Silvermines, County Tipperary, and operated by Magcobar (Ireland) Ltd., a wholly owned subsidiary of Dresser Industries Inc. of the United States. The open pit produced about 250,000 tons of barite at 90% to 95% of $BaSO_4$, using a conventional truck and shovel operation. The largest part of the barite produced was exported in crude form to Dresser grinding plants worldwide and was used in oil well drilling muds in the international oil industry. The Ballynoe open pit mine has an estimated life left of 6 to 8 years.

MINERAL FUELS

Ireland was largely dependent on imported oil, which accounted for 58% of total primary energy requirements, and imported coal, which accounted for 10% to 11% of the total. The most significant indigenous energy sources were solid fuel, mainly peat, which accounted for 14% of total primary energy, and indigenous gas, produced offshore, which contributed about 15%. Hydroelectric energy furnished about 2% of the total.

Coal.—Irish coal reserves were small and mainly of a low quality. Recoverable reserves of coal were estimated at 58 million tons, one-half of which was composed of high ash semibituminous coal in Connaught and the other one-half of semianthracite in the Lenister and Tipperary Coalfields.

Flair Resources Ltd. used an investment of $2.6 million and a grant of $1.7 million from Ireland's Industrial Development Authority to redesign and renovate mining and processing of anthracite deposits of Lickfinn, County Tipperary, 100 miles south of Dublin. The main coal seam contained more than 3 million tons of proven recoverable reserves of anthracite, enough to maintain maximum production for the next 25 years. Planned expansion over the next 4 years will lead to the production of 100,000 tons of sized and briquetted anthracite annually. The modernization program will involve the expenditure of more than $1.5 million on new facilities, including a briquetting plant, the latest in underground mining and transport equipment, and washing and screening installations. When the project is complete, anthracite production was expected to rise from 2,000 to 7,000 tons per month.

Natural Gas.—The pipeline from the Kinsale Head Gasfield was extended to Dublin and may be further extended to Northern Ireland, if a deal on the price of the gas is concluded between the governmental departments concerned. Natural gas was used largely for power generation and production of ammonia and fertilizers with a small proportion distributed in the Cork area. With the completion of the Cork-Dublin natural gas pipeline, it was estimated that the ultimate usage of gas will be as follows: 33% for premium markets and industry; 33% for electricity generation; and 29% for fertilizer production.

Petroleum.—In June, the Minister of Industry and Energy allocated 24 offshore blocks under the second licensing round to 10 consortia involving 37 companies, of which 21 were new to exploration of gas and oil in Ireland. After the second round awards, Ireland allocated an additional three blocks. The state-owned oil company, the Irish National Petroleum Corp. (INPC) was not involved.

The level of offshore oil exploration in Ireland declined considerably in 1982. Only three wells were drilled, compared with eight wells in 1981, and no significant hydrocarbon traces were found. Exploration

for oil was expected to continue and companies were planning to spend an estimated $200 million in the next few years. Irish imports of 100,000 barrels of oil per day in 1982 were valued at $1.4 billion or 13% of the value of total imports.

In April 1982, the Government purchased the Whitegate, County Cork, oil refinery, the only refinery in Ireland, which had previously been owned by a consortium of four major oil companies (Esso, Shell, Texaco, and BP) and which had ceased refining in June 1981.

INPC was required under the new law to operate the refinery and supply 35% of national petroleum product requirements therefrom.

Uranium.—Exploration for uranium started in 1975 and in 1982 came to an end. Only relatively small bodies of low-grade ore were discovered. World prices had declined from $45 to $18 per pound.

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[1]Foreign mineral specialist, Division of Foreign Data.
[2]Official exchange rate during 1982 for the Irish pound (£) to U.S. dollars was 1£ = US$1.42.

The Mineral Industry of Israel

By Suzann C. Ambrosio[1]

As a major world producer of bromine and potash, the mineral industry of Israel contributed approximately 6.3% to the 1981 gross national product (GNP) of $21 billion.[2] Although reexports of diamonds comprised approximately 5% of the GNP, Israel ranked second after the United States in bromine production, providing 18% of the world's supply of bromine and 4% of the world's supply of potash during 1982. Together these two commodities comprised 1% of the 1981 GNP, and the balance of the mineral industry's contribution, in order of descending value, was provided by phosphate, sand and gravel, limestone, clays, and salt. Output of nonmetallics and chemicals, fertilizer materials, and value added to the cut and polished diamond gem stones comprised the bulk of the industry. Israel Chemicals Ltd. (ICL), the Government holding company for all nonmetal mineral output, produced potash, bromine, and periclase from the Dead Sea brines and mined phosphate in the area between Beersheba and the Dead Sea. ICL planned to expand the output of potash, bromine, and phosphate over the next decade, especially since potash and phosphate resources have been increased through recent investigations of additional deposits.

Israel's economy grew 4.6% in real terms between 1980 and 1981, and the Government forecasted similar growth rates for 1982. Resulting in part from declining petroleum prices and tight monetary and fiscal policies, inflation started to decline in 1981, with the increase in the consumer price index falling from 133% in 1980 to 102% at yearend 1981. The proposed 1982 budget was 5% lower in real terms compared with the expanded 1981 budget, with 60% of the budget continuing to go to defense expenditures and debt repayment.

By yearend 1982, the 1983 budget and supplemental request reached $23 billion, representing a 19% increase over the 1981 budget. If implemented, the increased budget could worsen the balance of payments (BOP) deficit. The 1981 current account deficit increased 13% to $4.4 billion, and the trade deficit grew in excess of 100% to approximately $2 billion. The 1982 BOP forecast was for a slight improvement, resulting from increased exports and diminished current account deficits.

Discussions over the Mediterranean-Dead Sea canal project continued, and plans were made to increase the hydroelectric power capacity at the Dead Sea outlet by 40% to 800 megawatts. Similarly, the cost of the project grew 86% to $1.3 billion between 1980 and yearend 1982 in part because of the devalued Israeli currency. In addition, Merkorot Ltd., the national water supply company, proposed the construction of a large-scale seawater desalination plant as part of the project. At planned capacity, 100,000 cubic meters per day of freshwater would be removed, and the residual brine, separated by the reverse osmosis membranes, then returned to the Dead Sea. This would help offset the potentially damaging dilution of the Dead Sea waters through the mixing with less saline Mediterranean waters.

PRODUCTION AND TRADE

During 1981, the industrial production index regained the 4% loss measured during 1980 and resulted in a 10% gain over the 1978 base year. Gains were realized in nonmetallic mineral production. Potash and bromine output led the sector and were

important foreign exchange earners, while increased copper oxide and steel output was important to the domestic economy. Preliminary data available for 1982 indicated stepped-up production of phosphate, potash, and other fertilizer and chemical products. Potash capacity was planned to increase by nearly 25% to 2.1 million tons by 1985. Enhanced production of nitrogenous fertilizers and petrochemicals was planned for 1983. Diversifying fertilizer and chemical products, restructuring the gem stone cutting industry to include emeralds, and acquiring strong market footholds abroad have been some of the strategies successfully employed by the Israeli mineral industry. As the new high-grade phosphate fields, located east of Beersheba, become economically feasible, Israel could become increasingly competitive on a world scale.

Table 1.—Israel: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Copper, oxide (80%-90% Cu):[e]					
Gross weight	--	--	[3]800	NA	4,200
Metal content	--	--	600	NA	3,500
Iron and steel: Crude steel[e]	94,000	107,000	115,000	120,000	120,000
NONMETALS					
Barite (60% $BaSO_4$)	--	500	750	NA	NA
Bromine:					
Elemental	34,550	45,813	44,059	44,019	44,000
Compounds	23,550	32,387	31,792	32,248	32,000
Cement, hydraulic (from domestic clinker) thousand tons	1,750	1,720	1,842	2,060	2,000
Clays:					
Bentonite	6,952	6,287	18,321	12,581	13,000
Flint clay	33,656	17,690	14,351	9,133	10,000
Kaolin	6,350	22,317	9,495	37,299	35,000
Other	11,450	19,686	32,073	2,926	3,000
Gypsum	200,000	72,500	[e]80,000	42,000	50,000
Lime	124,000	[e]124,000	[e]124,000	80,000	80,000
Nitrogen: N content of ammonia	67,700	68,500	54,800	42,700	43,000
Phosphate rock, beneficiated thousand tons	1,725	2,086	2,307	1,919	2,300
Potash, K_2O equivalent do	744	737	797	839	1,000
Salt, marketed (mainly marine)	121,560	107,352	18,010	132,250	130,000
Sand:					
Glass sand	86,864	71,033	71,465	62,700	65,000
Other (for building industry) thousand cubic meters	3,705	3,787	3,900	4,100	4,000
Sodium and potassium compounds: Caustic soda	21,626	25,919	35,268	34,553	30,000
Stone:					
Crushed thousand cubic meters	NA	12,103	4,696	5,000	6,000
Dimension, marble do	[e]24,000	31,000	14,000	14,000	15,000
Sulfur:					
Byproduct from petroleum[e]	10,000	10,000	10,000	10,000	NA
Sulfuric acid thousand tons	183	226	321	297	230
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural, marketed million cubic feet	2,016	3,531	7,769	13,420	7,000
Peat[e] thousand tons	20	18	20	20	20
Petroleum and refinery products:					
Crude:					
From Israel proper thousand 42-gallon barrels	177	150	142	116	100
From occupied Sinai Peninsula[e] do	6,200	10,800	12,500	NA	--
Refinery products:					
Gasoline do	6,515	8,395	8,640	NA	NA
Kerosine and jet fuel do	5,663	6,205	6,120	NA	NA
Distillate fuel oil do	6,555	11,315	11,160	NA	NA
Residual fuel oil do	31,594	30,000	19,080	NA	NA
Lubricants do	NA	NA	360	NA	NA
Other do	2,565	2,800	5,760	NA	NA
Refinery fuel and losses do	1,050	2,200	3,960	NA	NA
Total do	53,942	60,915	55,080	NA	NA

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through June 30, 1983, provided mostly through the courtesy of the Geological Survey of Israel.

[2]In addition to the commodities listed, Israel reportedly has the capacity to produce 71 tons of U_3O_8 per year, but official data are not reported, and available information is inadequate to make reliable estimates of actual output levels.

[3]Production of copper cement reported in 1980 contained 70%-80% Cu metal.

The diamond sector continued to be one of the Nation's largest industrial export sectors, despite lower 1981 trade volumes, reduced inventories, constricted credit availability, and overall depressed markets. Rough diamond imports declined 39% to approximately 3.1 million carats, valued at $486 million, and exports of polished diamonds declined 4% to 2.2 million carats, valued at $1,067 million. In 1982, the Israeli Central Bureau of Statistics reported an approximate 8% diamond import growth, by value, to $570 million, and a 15% export decline to $908 million. The overall 1981 commodity trade surplus reached $2 million, but the 1982 commodity trade balance slipped back into a deficit of approximately $120 million. The diminished diamond trade, devaluation of the shekel, and the depressed state of world markets contributed to the 1982 trade deficit.

Israel continued to be nearly import dependent for metals and mineral fuels, although Israeli reexports of refined petroleum products, zinc, magnesium, beryllium, and copper products increased. Major trade partners continued to be the European Economic Community (EEC), followed by the United States and Asia. Israel enjoys two favorable trade preference systems including an agreement with the EEC that permits Israeli manufacturers duty-free access to the EEC, and participation in the U.S. Generalized System of Preferences, which allows a large variety of manufacturing categories to enter U.S. markets duty free.

COMMODITY REVIEW

METALS

Copper.—Timna Copper Mines Ltd. invested $6 million to reopen the Timna Mines located north of Eilat. The mines had previously produced 10,000 tons of copper annually in the form of cement copper, but were closed in 1976 because of depressed market prices. The remaining proven reserves, 21 million tons of copper ore, were to be processed into copper oxide, leaving the byproduct magnesium sulfate. Current production capacity was 4,200 tons of copper oxide and 7,000 to 10,000 tons of magnesium sulfate. Approximately 4,000 tons of copper metal was produced during 1981-82.

Iron and Steel.—The Dorot Foundry, located near Beersheba, was expected to receive two induction melting furnaces from Inductotherm Europe Ltd. (United Kingdom) during 1983. The two furnaces were expected to add 1,750 tons to the existing capacity.

Magnesium Compounds.—Production and export of high-grade magnesium oxides by Dead Sea Periclase Ltd. (DSP) remained relatively stable over the past 5 years. The value of periclase exports increased to approximately $21 million in 1981-82. Nearly all of the magnesium compounds were exported, while one of the byproducts, hydrochloric acid, was important to domestic markets. DSP research and development expenditures were aimed at reducing their high energy costs, equivalent to 40% of operating costs.

NONMETALS

Bromine.—The Dead Sea Bromine Group, comprised of Dead Sea Bromine Ltd., Bromine Compounds Ltd. (25% owned by Histadrut Ltd.), and Broomchemie BV (Netherlands), operated three plants in Beersheba and Ramat Hovav in Israel and Terneuzen in the Netherlands. In 1982, nearly 16% of the world production of bromine compounds came from the Ramat Hovav and to a lesser extent from the other two facilities. Of the $60 million sales revenues earned in 1981-82, 84% by value were exports. Future expansion plans focused on the research and development of new bromine products, including enhanced production of fire retardants.

Fertilizer Materials.—*Phosphorus.*—The Negev Phosphates Ltd. (NPL) discovered and commenced drill sampling of a large, relatively pure, high-grade phosphate field in the Negev Desert near Beersheba. The Israeli Geological Survey indicated at year-end 1982 that 100 million tons was proven reserves and total reserves approached 200 million tons. This approximate doubling of phosphate reserves was the basis for plans to double capacity and output of phosphate over the next decade to roughly 6 million tons. Preliminary studies have estimated development costs of $250 million, including the construction of a new $30 million enrichment plant.

Owing to the depressed world markets, NPL announced the closure of one of the

smaller one-half-million-ton phosphate plants at Oran. Losses over the past 2 years were estimated at $12 million by ICL. NPL's largest mine, Nahal Zin, was reported to be operating at 65% of capacity during 1981-82, and in combination with the older Arad and nearly depleted Makhtesh Mines, total phosphate output declined slightly. Consequently, sales revenues declined approximately 10% over that of 1981 to $110 million, and the approximate 90% share of exports was maintained.

ICL has strengthened its share of the phosphate market through the 1981 startup of the Mishor Rotem fertilizer plant and the 1982, $5.5 million purchase of a fertilizer plant in the Netherlands. The plant, located in Amsterdam, is expected to utilize approximately 25%, or 500,000 tons, of Israel's annual phosphate production. The Amsterdam plant will ensure annual Israeli phosphate exports valued at approximately $25 million in the near term and increased marketing and distribution of Israeli mineral products in European countries over the longer term.

Potash.—Dead Sea Works (DSW) contracted out the second-stage expansion of the new Makleff 470,000-ton facility to Bateman Engineering Ltd., a subsidiary of Edward L. Bateman Ltd. (Republic of South Africa). The first-phase expansion was completed in early 1982, and the second phase will add another 470,000 tons to its productive capacity at an approximate cost of $75 million. When completed in 1985, DSW's annual potash capacity will total 2.1 million tons.

Sales revenues reached approximately $145 million during 1981-82, with exports accounting for 88% of sales. The major export markets included Asia, Europe, and the United States. Roughly 12% of the potash output was processed domestically by Haifa Chemicals Ltd. and exported as potassium nitrate. Production and sales were expected to increase as the Makleff second-stage expansion comes onstream. Similarly, if ICL finds the Atacama Salt Flats potash reserves to be economically feasible, production capacity could be expanded.

MINERAL FUELS

Coal.—The second generating unit at the Hadera thermal power station reached full generating capacity of 350 megawatts in November 1982. The two operating units provided 35% of Israel's electricity and have the flexibility to be run on either oil or coal. When running on coal, daily savings were estimated at $275,000. Two more generating units were expected to be put into operation during 1984.

Oil.—The Israeli Energy Ministry reported plans to spend $45 million during 1983-84 on oil exploration. Fifteen wells were expected to be drilled, including 2 deep wells in the Sedom area near the Dead Sea and in the southern coastal plain area. Drilling in 1982, at Tzuq Tamrur near Arad, yielded 30 to 100 barrels daily of commercial quality petroleum. Natural gas has already been discovered and exploited in this Zohar region. Additional indications of commercial quantities of natural gas were identified at Ashdod, Nutra, and Shikma, with resources estimated in excess of 1 billion cubic feet.

The Oil Refineries Ltd. Haifa oil installation was undergoing renovation and modernization. Owing to increased reliance on coal-fired electric generation, the refinery is expected to decrease the output of heavy fuel oil. In addition, plans were made to raise the fluid catalytic cracking capacity from 15,000 to 18,500 barrels per day in 1983 and lubricant capacity from 600 to 1,000 barrels per day in 1984.

Oil Shale.—The Israeli Government, in majority 75% to 25% joint venture participation with three private firms, established Energy Resources Development Ltd. (PAMA). The firm was responsible for conducting research and development of oil shale technologies, including direct combustion and retort methods. The new shale oil deposits discovered in the Rotem Plain in the northern Negev region increased the proven reserves to approximately 5 billion tons. The shale beds' average organic content was 14%, although occurrences of 25% have been identified. In comparison, the quality of the shale oil deposits found in Israel was considered similar to European deposits and of a lower quality than U.S. deposits. The U.S. oil shale leased areas production cutoff ranged from 25 to 35 gallons of oil per ton of rock. PAMA was conducting a feasibility study for an integrated shale mining and retort plant with the capacity to produce 20,000 barrels of oil daily. Startup of a pilot shale plant was planned for 1983.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Israeli shekels (I) to U.S. dollars at the rate of I11.43 = US$1.00 for 1981 and I24.27 = US$1.00 for 1982.

The Mineral Industry of Italy

By Roman V. Sondermayer[1]

During 1982, the activities of the mineral sector, including smelting and refining, were adversely affected by world economic stagnation. Losses by most of the Government-owned companies were significant. However, as in the past, Italy remained an important processor and refiner of imported crude mineral commodities.

A new law regulating mining in Italy was approved by the parliament in the fall. In general, the law strengthens involvement of the Government in the mineral industry. It provides that basic exploration for minerals will be carried out at the state's expense by Ente Nazionale Idrocarburi (ENI), while for operational exploration the state will finance 60% of the total cost. In case exploration leads to production, the concessionaire will have to reimburse the state for its contributions, starting after the property has been in production for 3 years. Strategic mines, like the Monte Amiata mercury mine, will be kept operational at the Government's expense. In addition, ENI will also be reimbursed up to 60% of its expenses for exploration abroad.

During 1982, the major events in the mineral industry included discovery of a bauxite deposit in Sardinia, the beginning of construction of the first large copper refinery in Italy, restructuring of the Government-owned steel industry, reopening of Salafossa's lead and zinc mine, closure of a large petroleum refinery, and signing of a contract for deliveries of natural gas from Algeria through pipelines under the sea between Sicily and Tunisia.

PRODUCTION

The mining and processing sectors were owned by public and private enterprises, but the Government controlled most of the sector. ENI and Finsider, the Government-owned steel holding company, were the principal Government organizations involved in production and processing of minerals. Società Mineraria e Metallurgica di Pertusola S.A. (Pertusola), Acciaierie Ferriere Lombarda Falck (Falck), and major foreign oil and gas companies were the most prominent privately owned companies of the sector.

Table 1.—Italy: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
METALS					
Aluminum:					
Bauxite	24,410	26,095	23,260	19,000	23,010
Alumina	818,538	854,120	900,373	794,497	704,462
Metal:					
Primary	270,770	269,112	271,211	269,945	231,755
Secondary	222,000	245,000	266,000	e260,000	e260,000
Antimony:					
Mine output, metal content	931	950	713	696	339
Metal, total	808	776	676	792	963
Of which, regulus	14	--	--	--	--
Bismuth metal	9	19	40	19	28
Cadmium metal, smelter	378	527	568	482	515
Copper:					
Mine output, metal content	489	489	604	748	138
Metal, refined, secondary	17,500	15,600	12,200	23,700	e19,000
Iron and steel:					
Iron ore and concentrate:[2]					
Gross weight thousand tons	353	219	185	123	3
Iron content do	139	88	73	50	2
Metal:					
Pig iron do	11,340	11,327	12,149	12,260	12,717
Ferroalloys:					
Blast-furnace:					
Spiegeleisen	2,592	3,019	4,990	832	957
Ferromanganese	61,822	67,384	e61,000	59,302	57,366
Electric-furnace:					
Ferromanganese	28,107	21,886	e22,092	12,468	15,987
Silicomanganese	42,615	54,513	44,914	54,563	58,118
Ferrosilicon	67,700	80,521	71,857	55,144	63,947
Silicon metal	14,422	e15,000	e15,000	e15,000	15,000
Ferrochromium	36,877	42,531	41,150	10,333	36,541
Ferrochromium-silicon	230	(3)	--	--	--
Other	7,561	11,108	14,679	12,252	11,552
Total	261,926	295,962	275,682	219,894	259,468
Steel, crude thousand tons	24,283	24,250	26,501	24,777	23,981
Semimanufactures:					
Wire rod do	1,775	1,758	1,933	1,935	NA
Sections do	7,965	8,331	8,782	7,812	NA
Plates and sheets do	5,545	5,457	5,895	6,453	NA
Hoop and strip do	822	872	871	781	NA
Railway track material do	197	221	217	216	NA
Ingots, semimanufactures and solids for tubes do	1,089	1,058	1,089	1,276	NA
Other do	602	851	859	1,232	NA
Total do	17,995	18,548	19,646	19,705	NA
Castings and forgings do	631	672	747	568	NA
Cold-rolled sheet do	2,785	2,851	NA	2,646	NA
Seamless tubes do	836	824	880	1,089	NA
Lead:					
Mine output, metal content	30,500	28,057	22,879	21,568	16,188
Metal:					
Refined:					
Primary	31,110	26,840	42,057	40,408	36,900
Secondary	85,100	101,000	91,600	91,600	90,000
Magnesium metal, primary	9,678	8,757	7,886	7,823	7,680
Manganese, mine output:					
Gross weight	9,741	9,782	9,165	8,756	e9,000
Metal content	2,143	2,935	2,763	2,614	e2,000
Mercury metal 76-pound flasks	87	--	96	5,516	4,612
Silver metal thousand troy ounces	890	1,065	1,366	1,768	55,737
Tin alloys	6,100	5,600	e5,500	NA	NA
Zinc:					
Mine output, metal content	73,329	66,285	58,417	43,906	39,601
Metal, primary	177,552	202,272	206,430	180,903	158,560
NONMETALS					
Asbestos	135,402	143,931	157,794	137,086	116,410
Barite	236,613	214,630	203,038	177,005	180,022
Bromine	e590	e590	e590	e600	600
Cement, hydraulic thousand tons	38,232	39,289	41,772	41,553	e42,000

See footnotes at end of table.

Table 1.—Italy: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
NONMETALS —Continued					
Clays, crude:					
Bentonite ____ thousand tons	235	282	332	277	237
Refractory excluding kaolinitic earth ____do____	363	268	226	270	e250
Fuller's earth ____	3,975	1,080	4,300	5,495	e5,500
Kaolin ____ thousand tons	70	67	89	74	53
Kaolinitic earth ____do____	3	25	27	31	30
Diatomite[e] ____	30,000	30,000	30,000	25,000	20,000
Feldspar ____	250,972	294,648	344,301	428,485	783,411
Fluorspar:					
Acid-grade ____	130,018	134,349	124,774	128,838	134,127
Metallurgical-grade ____	27,500	41,557	26,229	35,397	32,822
Ceramic-grade ____	13,580	6,885	962	--	--
Total ____	171,098	182,791	151,965	164,235	166,949
Graphite, all grades ____	4,108	4,102	3,957	3,535	3,210
Gypsum, except dimension stone use thousand tons	e4,200	e4,200	e4,200	4,820	e1,600
Lime, hydrated and quicklime ____do____	2,141	r2,182	2,365	2,307	e2,300
Nitrogen: N content of ammonia ____do____	1,444	r1,458	r1,409	1,210	1,406
Perlite[e] ____	90,000	90,000	90,000	85,000	80,000
Pigments, mineral: Iron oxides, natural[e] ____	1,400	1,000	1,000	900	800
Potash, crude salts:					
Gross weight ____ thousand tons	1,636	1,527	1,302	1,418	1,350
K_2O equivalent ____do____	196	182	156	170	160
Pumice and related materials:					
Pumice and pumiceous lapilli ____do____	e780	e850	571	e600	e750
Pozzolan ____do____	e5,800	e5,900	5,156	e6,000	e5,500
Pyrites, all types, gross weight ____do____	786	804	859	681	667
Salt:					
Marine, crude ____do____	1,210	e1,200	e1,300	964	e1,000
Rock and brine ____do____	3,721	4,490	3,997	3,601	3,604
Sodium and potassium compounds:					
Caustic soda ____	9,871	9,858	9,531	8,484	e9,000
Sodium carbonate[e] ____ thousand tons	95	95	95	95	90
Sodium sulfate ____do____	1,012	e1,010	e1,000	e900	e850
Stone:					
Dimension:[4]					
Calcareous:					
Alabaster and onyx ____do____	NA	NA	4,000	e3,500	NA
Limestone ____do____	e850	NA	NA	NA	NA
Marble in blocks:					
White ____do____	e1,100	NA	1,200	e1,100	NA
Colored ____do____	e800	NA	1,016	e1,000	NA
Schist (calcareous) ____do____	e35	NA	908	e900	NA
Travertine ____do____	e1,330	1,302	1,072	e1,100	NA
Tufa ____do____	e3,500	NA	1,449	e1,500	NA
Other:					
Gneiss ____do____	448	NA	NA	NA	NA
Granite ____do____	740	NA	1,474	e1,500	NA
Lava, basalt, trachyte ____do____	5,660	NA	4,112	e4,100	NA
Porphyry ____do____	e350	NA	932	e950	NA
Sandstone ____do____	e470	NA	NA	NA	NA
Slate ____do____	100	NA	1,021	e1,100	NA
Tuff, volcanic ____do____	e2,400	NA	8,173	e8,200	NA
Crushed and broken:					
Calcareous:					
Dolomite ____do____	1,000	NA	1,032	e1,100	NA
Limestone:					
For cement and lime ____do____	e39,000	e40,000	56,176	e56,200	NA
For construction ____do____	e12,000	e12,500			
Other:					
Porphyry ____do____	NA	NA	932	e950	NA
Quartz and quartzite ____do____	e480	NA	NA	e1,100	NA
Sandstone ____do____	NA	NA	1,250	NA	NA
Serpentine[4] ____do____	e525	NA	1,880	1,900	NA
Tuff, volcanic ____do____	3,000	NA	8,173	e8,200	NA
Strontium minerals: Celestite ____	365	1,693	1,053	6,697	6,500
Sulfur:					
Gross weight of ore ____ thousand tons	523	108	101	96	88
Recovered as elemental and in compounds:					
Elemental from ore ____do____	104	19	23	20	10
S content of pyrites ____do____	330	302	331	261	e250
Byproduct, oil refining ____do____	e36	e37	30	25	e20
Byproduct, other sources[e] ____do____	214	213	220	205	200
Total ____do____	684	571	604	511	e480

See footnotes at end of table.

Table 1.—Italy: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
NONMETALS —Continued					
Talc and related materials	167,740	157,382	165,905	163,390	163,970
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bituminous rock, natural:					
For distillation	46,638	124,731	117,893	e10,000	e105,000
For paving	68,560				
Carbon black	155,763	e170,000	e170,000	e170,000	e160,000
Coal:					
Lignite thousand tons	1,868	2,123	1,933	1,958	1,900
Coke, metallurgical do	7,317	7,502	e7,600	NA	NA
Gas, natural, marketed million cubic feet	484,932	475,553	442,543	495,944	NA
Natural gas liquids thousand 42-gallon barrels	239	141	150	140	NA
Total of which: Natural gas	36	35	NA	NA	NA
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	9,893	11,360	12,264	1,446,000	NA
Refinery products:					
Gasoline:					
Aviation do	303	578	1,709	1,249	NA
Motor do	138,975	141,398	124,550	126,446	NA
Jet fuel do	15,680	16,520	14,720	13,040	NA
Kerosine do	23,436	24,784	18,747	19,150	23,405
Distillate fuel oil do	222,584	225,889	190,603	186,813	181,822
Residual fuel oil do	318,448	333,300	244,935	229,210	211,754
Lubricants do	5,985	6,440	7,196	6,356	NA
Other do	85,632	86,788	76,105	30,231	30,321
Refinery fuel and losses do	54,263	49,696	42,231	41,321	NA
Total do	865,306	885,393	720,796	653,816	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Sept. 6, 1983.

[2]Excludes pelletized iron oxide derived from pyrites.

[3]Included with "Ferroalloys: Other".

[4]Serpentine output for dimension stone applications, if any, is included with "Stone: Crushed and broken."

TRADE

As in the past, Italy remained dependent on imports of large quantities of raw materials for production of metals and fuels.

Table 2.—Italy: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Alkaline-earth metals	96	213	--	Yugoslavia 50.
Rare-earth metals	26	10	NA	NA.
Unspecified value	$4,793	$20,118	NA	NA.
Aluminum:				
Ore and concentrate	24,163	18,229	--	Greece 7,253; Spain 4,550.
Oxides and hydroxides	423,994	231,199	--	Netherlands 120,720; Norway 62,155.
Ash and residue containing aluminum	4,025	4,641	--	France 2,141; West Germany 1,810.
Metal including alloys:				
Scrap	1,434	3,167	--	West Germany 1,448; France 1,072.
Unwrought	12,761	49,802	900	West Germany 11,326; Netherlands 9,017.
Semimanufactures	88,433	97,467	7,103	West Germany 20,741; France 20,730.
Antimony:				
Ore and concentrate	82	209	--	Austria 208.
Metal including alloys, all forms	3	37	NA	NA.

See footnotes at end of table.

Table 2.—Italy: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Bismuth: Metal including alloys, all forms	5	12	6	NA.
Cadmium: Metal including alloys, all forms	321	259	36	West Germany 80; Belgium-Luxembourg 78; U.S.S.R. 45.
Chromium:				
Ore and concentrate	2,034	3,046	--	Austria 1,222; Albania 779.
Oxides and hydroxides	2,142	3,191	732	France 714; Romania 268; Netherlands 210.
Metal including alloys, all forms	8	5	2	Spain 1.
Cobalt:				
Oxides and hydroxides	(1)	25	NA	NA.
Metal including alloys, all forms	30	27	13	NA.
Columbium and tantalum: Metal including alloys, all forms, tantalum	(1)	9	--	United Kingdom 3; West Germany 2.
Copper:				
Ore and concentrate	4,125	2,356	--	United Kingdom 1,550; Yugoslavia 806.
Matte and speiss including cement copper	1,073	1,232	--	Spain 1,082; West Germany 72.
Oxides and hydroxides	--	1,054	--	France 290; West Germany 263.
Sulfate	4,813	8,028	--	Greece 3,250; West Germany 1,707.
Ash and residue containing copper	16,474	19,527	--	West Germany 12,926; Austria 4,368.
Metal including alloys:				
Scrap	11,148	24,533	567	West Germany 13,442; Belgium-Luxembourg 5,832.
Unwrought	4,310	7,977	239	West Germany 2,046; France 1,047.
Semimanufactures	96,217	101,228	699	France 23,299; West Germany 15,877.
Gallium: Metal including alloys, all forms ---- kilograms	800	--		
Germanium: Metal including alloys, all forms ---- do	200	7,000	--	France 5,200; Switzerland 1,000.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	1,224	22	--	NA.
Pyrite, roasted	46,559	46,934	--	France 33,738; Switzerland 6,481.
Metal:				
Scrap	8,480	22,636	18	West Germany 11,862; France 6,712.
Pig iron, cast iron, related materials	12,074	6,645	117	France 1,496; Netherlands 1,316.
Ferroalloys:				
Ferrochromium	r10,303	8,805	637	West Germany 5,167; France 613.
Ferromanganese	r1,896	672	--	West Germany 441; France 124.
Ferromolybdenum	r1,273	430	--	Netherlands 340; West Germany 20.
Ferronickel	r73	50	--	Austria 25.
Ferrosilicomanganese	r862	8,380	2,017	West Germany 5,190; Portugal 500.
Ferrosilicon	r5,579	6,626	172	West Germany 2,380; France 2,332.
Unspecified	r3,339	4,378	87	West Germany 1,520; Romania 806.
Steel, primary forms	695,302	963,294	87,524	West Germany 98,369; Netherlands 95,342.
Semimanufactures:				
Bars, rods, angles, shapes, sections ---- thousand tons	3,057	2,953	14	West Germany 787; France 622.
Universals, plates, sheets do	1,193	1,625	156	France 315; U.S.S.R. 275; West Germany 182.
Hoop and strip ---- do	106	107	(1)	U.S.S.R. 20; France 19; Brazil 11.
Rails and accessories do	11	18	(1)	Egypt 7; Switzerland 6.
Wire ---- do	80	95	4	France 25; West Germany 12.
Tubes, pipes, fittings do	1,615	2,465	594	U.S.S.R. 499; France 172; Saudi Arabia 154.
Castings and forgings, rough do	27	47	1	Yugoslavia 12; West Germany 8.
Lead:				
Ore and concentrate	21,353	17,319	--	Greece 8,720; Spain 4,188.
Oxides	21	95	NA	NA.
Ash and residue containing lead	7,758	14,026	--	Belgium-Luxembourg 7,892; France 5,709.
Metal including alloys:				
Scrap	21	180	--	West Germany 158; Denmark 21.
Unwrought	4,199	4,436	5	Libya 1,594; Belgium-Luxembourg 1,130.
Semimanufactures	855	1,266	19	Libya 859; Saudi Arabia 185.
Magnesium: Metal including alloys:				
Scrap	554	856	587	France 198; West Germany 40.
Unwrought	4,285	6,832	36	West Germany 5,080; Austria 740.
Semimanufactures	249	351	90	France 140; West Germany 58.

See footnotes at end of table.

Table 2.—Italy: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical-grade	203	1,312	NA	NA.
Oxides	124	107	--	West Germany 46.
Metal including alloys, all forms	73	42	NA	NA.
Mercury 76-pound flasks	6,681	1,421	NA	West Germany 812.
Metalloids:				
Arsenic, oxides and acids	94	125	NA	West Germany 40; Belgium-Luxembourg 39.
Selenium kilograms	700	4,000	NA	NA.
Silicon	r7,345	8,044	213	West Germany 3,313; Romania 1,650.
Tellurium[2]	11	53	--	Netherlands 4.
Molybdenum:				
Ore and concentrate	179	209	--	Austria 208.
Metal including alloys, all forms	10	6	NA	NA.
Nickel:				
Matte and speiss	2	24	--	France 22.
Oxides and hydroxides	(1)	15	NA	NA.
Metal including alloys:				
Scrap	271	318	--	West Germany 186; United Kingdom 87.
Unwrought	168	131	--	United Kingdom 52; Netherlands 40.
Semimanufactures	500	631	6	France 96; United Kingdom 88.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified thousand troy ounces	162	151	2	West Germany 21; Switzerland 16.
Silver:				
Waste and sweepings value, thousands	$98	$124	$65	United Kingdom $56.
Metal including alloys, unwrought and partly wrought thousand troy ounces	7,912	3,697	--	Switzerland 2,460; United Kingdom 273.
Tin:				
Oxides	176	201	--	Spain 66; France 64.
Metal including alloys, scrap	--	121	--	France 43; Netherlands 35.
Titanium:				
Ore and concentrate	96	54	NA	NA.
Oxides	1,867	1,965	--	Republic of Korea 384; Yugoslavia 348.
Metal including alloys, all forms	118	63	--	West Germany 11; Switzerland 5.
Tungsten:				
Ore and concentrate value	$4,212	--		
Metal including alloys, all forms	65	96	--	West Germany 45; Belgium-Luxembourg 15.
Uranium and/or thorium:				
Oxides and other compounds value	$42,253	$1,759	NA	NA.
Metal including alloys, all forms, uranium	--	1	NA	NA.
Vanadium:				
Oxides and hydroxides	--	9	NA	NA.
Metal including alloys, all forms value	$6,146	[3]3	NA	NA.
Zinc:				
Ore and concentrate	2,908	582	--	Austria 502; Portugal 17.
Oxides	4,756	3,069	--	West Germany 1,048; France 1,045.
Blue powder	114	826	--	France 361; West Germany 343.
Matte	r35	5,274	--	Belgium-Luxembourg 4,600; West Germany 516.
Ash and residue containing zinc	r6,978	8,223	--	Mainly to West Germany.
Metal including alloys:				
Scrap	2,138	3,432	--	West Germany 2,614; Belgium-Luxembourg 515.
Unwrought	20,340	20,569	7,999	France 4,739; Switzerland 2,474.
Semimanufactures	2,016	4,362	--	France 1,281; Portugal 244.
Zirconium:				
Ore and concentrate	487	2,925	--	Hungary 2,535.
Metal including alloys, all forms	(1)	80	NA	France 49.
Other:				
Ores and concentrates	2,746	10,852	--	France 9,889; West Germany 83.
Oxides and hydroxides	664	1,907	NA	NA.
Ashes and residues	18,201	10,438	--	France 5,151; West Germany 3,589.
Cermets	--	5	NA	NA.
Base metals including alloys, all forms	13	(1)	NA	NA.

See footnotes at end of table.

Table 2.—Italy: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	220,100	112,653	--	Algeria 52,487; United Kingdom 37,188.
Artificial: Corundum	2,197	1,410	--	Bulgaria 532; Poland 244.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	92	56	NA	Switzerland 14.
Grinding and polishing wheels and stones	17,667	23,537	379	France 3,551; Saudi Arabia 2,090; West Germany 1,833.
Asbestos, crude	63,815	51,245	--	West Germany 20,420; Japan 5,685.
Barite and witherite	105,358	67,135	--	Egypt 19,427; Netherlands 13,689.
Boron materials:				
Crude natural borates	3,650	7,332	1,752	Czechoslovakia 3,664; Yugoslavia 1,122.
Oxides and acids	5,042	4,048	--	West Germany 1,846; France 750.
Cement thousand tons	821	623	(1)	Libya 170; Nigeria 99; Switzerland 92.
Chalk	554	667	NA	NA.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	--	177	NA	NA.
Bentonite	18,967	36,297	--	Norway 18,860; France 7,448.
Chamotte earth	--	3,500	--	Tunisia 3,100.
Dinas earth	--	27	NA	NA.
Kaolin	30,008	20,564	NA	France 17,207.
Unspecified	7,295	4,555	--	France 964; United Kingdom 356.
Products:				
Nonrefractory thousand tons	2,720	2,539	164	West Germany 561; France 454.
Refractory including nonclay brick	133,062	128,556	231	Brazil 29,721; West Germany 13,961.
Cryolite and chiolite	28	25	NA	NA.
Diamond:				
Gem, not set or strung carats	75,586	214,915	4,879	NA.
Industrial do	142,402	232,358	NA	Yugoslavia 217,599.
Diatomite and other infusorial earth	885	1,627	NA	Switzerland 307; Yugoslavia 244.
Feldspar, fluorspar, related materials:				
Feldspar	r37,035	34,501	--	West Germany 15,257; Switzerland 7,553.
Fluorspar	83,753	84,634	29,467	West Germany 21,050; Canada 7,700.
Unspecified	309	2,928	--	Greece 2,836.
Fertilizer materials:				
Crude, n.e.s	r9,987	15,735	--	France 9,830; Austria 1,625.
Manufactured:				
Ammonia	53,160	39,205	--	Israel 30,611; Turkey 3,009.
Nitrogenous thousand tons	1,320	1,014	--	India 319; Greece 87; Egypt 85.
Phosphatic do	2	21	--	Libya 5; Switzerland 2.
Potassic do	72	41	--	Algeria 22; Japan 10.
Unspecified and mixed do	282	369	--	West Germany 56; Nigeria 55.
Graphite, natural	3,414	1,649	--	France 667; West Germany 448.
Gypsum and plaster	13,003	13,800	--	Switzerland 9,861.
Lime	33,639	47,505	--	Switzerland 29,397; France 12,166.
Magnesium compounds: Magnesite	120,812	90,325	90	Austria 21,370; Republic of South Africa 17,620; Netherlands 17,450.
Mica:				
Crude including splittings and waste	1,127	747	NA	NA.
Worked including agglomerated splittings	142	53	NA	NA.
Phosphates, crude	81	213	--	Saudi Arabia 80; Czechoslovakia 62.
Pigments, mineral: Iron oxides and hydroxides, processed	2,901	2,603	--	France 1,082; West Germany 217.
Precious and semiprecious stones other than diamond:				
Natural kilograms	17,732	32,547	NA	West Germany 18,820; Kuwait 5,000.
Synthetic	2,778	14,423	NA	NA.
Pyrite, unroasted	3,797	30,355	--	United Kingdom 12,891; Turkey 8,854.
Salt and brine thousand tons	740	394	33	Sweden 78; Greece 65; United Kingdom 59.

See footnotes at end of table.

Table 2.—Italy: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	17	46,405	--	Turkey 30,212; U.S.S.R. 7,680.
Sodium carbonate, natural and manufactured	14,605	16,506	40	Israel 9,970; Algeria 4,096; Greece 2,277.
Sodium hydroxide	265,212	133,882	3,000	U.S.S.R. 31,785; Turkey 12,106; Yugoslavia 11,277.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	539,083	503,273	12,630	Saudi Arabia 66,228; West Germany 61,622.
Worked thousand tons	1,299	1,217	102	West Germany 408; Saudi Arabia 230; Switzerland 67.
Dolomite, chiefly refractory-grade	58,555	33,466	--	Switzerland 20,416; France 2,964.
Gravel and crushed rock	660,670	648,204	708	Kuwait 115,042; Switzerland 109,528.
Limestone other than dimension	7,336	497	--	Switzerland 395; Israel 36.
Quartz and quartzite	44,779	35,725	--	Switzerland 18,110; France 10,882.
Sand other than metal-bearing	253,140	25,936	NA	Switzerland 17,069; Yugoslavia 2,906.
Sulfur:				
Elemental:				
Crude including native and by-product	r3,817	3,094	--	Yugoslavia 942; France 912; West Germany 835.
Colloidal, precipitated, sublimed	r48	195	NA	NA.
Sulfuric acid	81,931	71,261	--	Republic of South Africa 44,331; Turkey 10,881.
Talc, steatite, soapstone, pyrophyllite	54,015	52,180	11,660	France 11,151; West Germany 10,065.
Other:				
Crude	82,329	42,822	--	United Kingdom 23,538; U.S.S.R. 3,000.
Slag and dross, not metal-bearing	378,133	577,604	--	Greece 359,454; Yugoslavia 161,517.
Oxides and hydroxides of barium, magnesium, strontium	1,887	1,945	396	Japan 366; United Kingdom 317.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	167,438	113,832	3,920	France 48,867; Libya 11,629.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3,336	3,541	--	Nigeria 2,000; Somalia 907.
Carbon:				
Carbon black	r43,028	44,069	--	Yugoslavia 21,327; Austria 7,009; France 6,143.
Gas carbon	NA	NA		
Coal:				
Anthracite	18,890	19,777	--	France 8,761; Austria 4,891.
Briquets of anthracite and bituminous coal	--	21	--	NA.
Lignite including briquets	--	29	--	All to Austria.
Coke and semicoke	746,530	642,038	--	Romania 358,800; Austria 70,186.
Gas, natural thousand cubic feet	1,373	1,874	NA	NA.
Peat including briquets and litter	277	447	--	Switzerland 206; Romania 70.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	3,075	2,041	106	France 584; Egypt 278; Greece 149.
Gasoline, motor do	36,891	35,710	4,084	France 6,268; Netherlands 5,759.
Mineral jelly and wax do	17	48	1	West Germany 12; France 2.
Kerosine and jet fuel do	18,880	16,492	(1)	United Kingdom 2,160; Greece 995.
Distillate fuel oil do	24,056	31,020	174	Libya 5,611; Saudi Arabia 3,938; Egypt 2,039.
Lubricants do	4,331	3,488	236	Belgium-Luxembourg 284; Algeria 262; U.S.S.R. 212.
Residual fuel oil do	28,481	28,004	544	Netherlands 3,755; Algeria 1,783; Malta 1,495.
Bitumen and other residues do	987	1,006	(1)	Austria 480; Switzerland 190; Lebanon 111.
Bituminous mixtures do	51	39	(1)	Netherlands 12; Libya 7; Somalia 4.
Petroleum coke do	132	66	--	Yugoslavia 53.
Tars and other crude chemicals derived from coal, gas, and petroleum	72,122	125,637	2	France 44,526; Yugoslavia 24,450.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]Includes arsenic.
[3]Metric tons.

Table 3.—Italy: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Alkaline-earth metals	5,520	4,728	25	West Germany 3,621; France 781.
Rare-earth metals	138	371	--	Austria 263.
Unspecified value, thousands	$908	$833	--	France $560; Austria $255.
Aluminum:				
Ore and concentrate thousand tons	2,288	1,709	--	Australia 1,162; Guinea 366.
Oxides and hydroxides	180,187	169,811	--	West Germany 1,331; Netherlands 1,124.
Ash and residue containing aluminum	59,147	65,986	--	Austria 47,134; West Germany 3,337.
Metal including alloys:				
Scrap	79,093	56,610	1,405	West Germany 18,131; Switzerland 12,211.
Unwrought	339,185	208,829	1,557	France 51,242; West Germany 47,187.
Semimanufactures	112,642	83,018	6,193	West Germany 35,890; France 21,444.
Antimony:				
Ore and concentrate	3	5	NA	NA.
Metal including alloys, all forms	106	81	NA	NA.
Beryllium: Metal including alloys, all forms kilograms	7,800	--		
Bismuth: Metal including alloys, all forms	62	35	--	United Kingdom 12.
Cadmium: Metal including alloys, all forms	68	85	--	Finland 50; West Germany 27.
Chromium:				
Ore and concentrate	171,045	91,806	--	Republic of South Africa 37,278; Turkey 24,927.
Oxides and hydroxides	1,941	1,840	--	West Germany 1,559; U.S.S.R. 150.
Metal including alloys, all forms	186	175	--	United Kingdom 83; France 48.
Cobalt:				
Oxides and hydroxides	192	190	--	Belgium-Luxembourg 53; United Kingdom 61.
Metal including alloys, all forms	258	209	3	France 66; Belgium-Luxembourg 54; United Kingdom 35.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium)	1	1	1	
Tantalum	11	7	1	NA.
Copper:				
Ore and concentrate	10,479	11	--	All from Belgium-Luxembourg.
Matte and speiss including cement copper	51	177	--	Austria 150; Belgium-Luxembourg 24.
Sulfate	2,205	8,773	--	Yugoslavia 7,278; Czechoslovakia 772.
Ash and residue containing copper	4,599	6,985	--	Austria 6,365.
Metal including alloys:				
Scrap	99,524	59,336	798	France 19,329; West Germany 15,910.
Unwrought	396,329	329,332	7,601	Spain 19,747; Yugoslavia 10,625.
Semimanufactures	144,188	104,890	679	France 37,116; West Germany 28,602.
Gallium: Metal including alloys, all forms kilograms	1,400	1,400	--	United Kingdom 6; Belgium-Luxembourg 5.
Germanium: Metal including alloys, all forms do	1,200	300	--	Belgium-Luxembourg 200.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	16,912	15,196	(1)	Brazil 4,684; Liberia 3,224; Mauritania 1,724.
Pyrite, roasted	762	14,458	--	Mauritania 14,400.
Metal:				
Scrap thousand tons	7,411	5,540	34	West Germany 2,344; France 2,169.
Pig iron, cast iron, related materials do	749	640	(1)	France 158; West Germany 126.

See footnotes at end of table.

Table 3.—Italy: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys:				
Ferrochromium, thousand tons	87	73	--	Zimbabwe 23; Switzerland 22; Republic of South Africa 11.
Ferromanganese, do	120	100	--	France 54; Republic of South Africa 16.
Ferromolybdenum, do	r1	1	--	NA.
Ferronickel, do	r18	12	(1)	France 7; Dominica 2.
Ferrosilicochromium, do	r4	2	--	Mainly from France.
Ferrosilicomanganese, do	r36	29	--	Norway 16; Republic of South Africa 6.
Ferrosilicon, do	r53	55	--	France 14; Yugoslavia 12.
Unspecified, do	r11	7	--	France 2; Brazil 1; West Germany 1.
Steel, primary forms, do	3,355	2,330	17	France 799; Belgium-Luxembourg 435.
Semimanufactures:				
Bars, rods, angles, shapes, sections, do	960	778	1	France 299; West Germany 164.
Universals, plates, sheets, do	2,087	1,345	37	France 424; West Germany 238.
Hoop and strip, do	199	140	1	West Germany 53; France 51.
Rails and accessories, do	149	78	(1)	Netherlands 20; West Germany 17.
Wire, do	79	57	(1)	Belgium-Luxembourg 24; Austria 7.
Tubes, pipes, fittings, do	335	226	3	West Germany 76; France 75.
Castings and forgings, rough, do	9	9	(1)	West Germany 2; Belgium-Luxembourg 1; France 1.
Lead:				
Ore and concentrate	44,264	24,373	--	Canada 8,259; Greece 5,694.
Oxides	4,514	5,254	--	Netherlands 2,466; West Germany 2,380.
Ash and residue containing lead	2,149	893	--	Hungary 480; West Germany 181.
Metal including alloys:				
Scrap	44,139	15,267	--	France 5,286; Switzerland 3,521.
Unwrought	173,235	132,783	--	West Germany 38,286.
Semimanufactures	1,468	1,458	--	Yugoslavia 638; West Germany 345.
Magnesium: Metal including alloys:				
Scrap	2,558	1,758	--	West Germany 863; Netherlands 219; Austria 205.
Unwrought	1,880	638	72	Norway 297; France 126.
Semimanufactures	309	178	118	United Kingdom 19.
Manganese:				
Ore and concentrate	409,846	354,225	--	Republic of South Africa 147,011; Gabon 107,886.
Oxides	3,082	902	--	Belgium-Luxembourg 564; Netherlands 120.
Metal including alloys, all forms	1,397	1,711	38	France 949; Republic of South Africa 512.
Mercury, 76-pound flasks	5,120	2,350	--	Netherlands 783; China 493.
Metalloids:				
Arsenic, oxides and acids	852	750	--	Belgium-Luxembourg 362; France 295.
Selenium	26	25	--	United Kingdom 11; Japan 7.
Silicon	r8,706	5,771	--	France 1,732; Switzerland 1,501.
Tellurium[2]	57	65	4	Switzerland 32.
Unspecified	14	51	NA	NA.
Molybdenum:				
Ore and concentrate	6,039	4,522	566	Netherlands 3,031; Chile 354.
Metal including alloys, all forms	163	120	42	Austria 34; Netherlands 26.
Nickel:				
Matte and speiss	2,710	1,783	--	Cuba 1,137; Canada 129.
Ash and residue containing nickel, kilograms	NA	8,300	--	All from United Kingdom.
Metal including alloys:				
Scrap	677	335	24	Finland 100; Norway 58.
Unwrought	18,738	12,137	1,944	Republic of South Africa 2,684; Canada 1,973.
Semimanufactures	2,835	2,424	275	United Kingdom 736; West Germany 658.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified, thousand troy ounces	570	172	4	United Kingdom 58; Switzerland 47.

See footnotes at end of table.

Table 3.—Italy: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	18,782	17,313	405	United Kingdom 2,504; Switzerland 2,427; Belgium-Luxembourg 2,051.
Tin: Metal including alloys:				
Scrap kilograms	4,600	11,800	--	Netherlands 9,900.
Unwrought	6,874	4,806	--	Indonesia 1,730; Malaysia 1,656.
Semimanufactures	435	223	--	United Kingdom 66; West Germany 65; France 60.
Titanium:				
Ore and concentrate	5,450	3,917	--	Republic of South Africa 2,906.
Oxides	39,406	43,205	--	West Germany 17,837; France 11,588.
Metal including alloys, all forms	1,539	1,945	1,040	West Germany 282; Austria 242; France 107.
Tungsten:				
Ore and concentrate	173	83	--	West Germany 23; Spain 22.
Ash and residue containing tungsten kilograms	NA	23,700	--	NA.
Metal including alloys, all forms	103	84	6	West Germany 20; United Kingdom 19.
Uranium and/or thorium:				
Oxides and other compounds value, thousands	$206	$1,916	--	U.S.S.R. $968; France $932.
Metal including alloys, all forms, uranium kilograms	2,700	5,000	5,000	
Vanadium:				
Ore and concentrate	24	3	NA	NA.
Oxides and hydroxides	481	194	--	China 125; Austria 69.
Ash and residue containing vanadium	NA	2,747	--	West Germany 1,569.
Metal including alloys, all forms kilograms	41,800	3,700	--	NA.
Zinc:				
Ore and concentrate	357,062	264,585	--	Peru 91,328; Canada 62,650.
Oxides	5,894	5,683	--	West Germany 1,331; Netherlands 1,224.
Blue powder	987	1,764	--	West Germany 804; France 692.
Matte	9,122	5,784	--	France 1,894; West Germany 1,696.
Ash and residue containing zinc	6,456	3,459	--	West Germany 2,821; Switzerland 397.
Metal including alloys:				
Scrap	3,358	6,520	--	France 2,862; West Germany 2,178.
Unwrought	55,248	50,092	--	West Germany 19,144; Netherlands 9,306.
Semimanufactures	2,749	2,626	--	West Germany 1,548; France 605.
Zirconium:				
Ore and concentrate	65,696	55,853	--	Australia 52,504; West Germany 1,017.
Metal including alloys, all forms	46	79	--	United Kingdom 48.
Other:				
Ores and concentrates	34,800	23,645	--	Greece 18,696.
Oxides and hydroxides	6,920	6,374	66	Cuba 2,597; West Germany 1,489.
Ashes and residues	r88,616	88,276	--	Republic of South Africa 83,915.
Cermets	35	40	--	West Germany 27; Belgium-Luxembourg 7.
Base metals including alloys, all forms	r(1)	(1)	--	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,986	1,618	80	Greece 1,001; Yugoslavia 250.
Artificial: Corundum	33,350	26,214	--	West Germany 7,369; Austria 5,381.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	1,839	1,841	862	Ireland 806.
Grinding and polishing wheels and stones	4,326	3,725	135	Austria 909; West Germany 735.
Asbestos, crude	86,550	65,942	160	Republic of South Africa 23,105; Canada 22,624.
Barite and witherite	7,530	9,665	--	Ireland 4,630; France 4,192.
Boron materials:				
Crude natural borates	175,880	145,850	18,619	Turkey 111,423; Netherlands 14,419.
Oxides and acids	5,022	1,912	--	Yugoslavia 895; Turkey 560.

See footnotes at end of table.

Table 3.—Italy: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Cement	81,264	201,199	180	Yugoslavia 121,226; France 69,252.
Chalk	17,844	14,192	--	France 13,309.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	r31,499	7,011	2,880	West Germany 2,518; Spain 1,430.
Bentonite	55,438	25,440	216	Greece 20,978; West Germany 1,491.
Chamotte earth	r130,371	135,091	--	France 65,474; West Germany 29,197.
Dinas earth	2,969	1,582	--	West Germany 1,487.
Kaolin	791,216	646,354	165,625	United Kingdom 286,111; France 72,520.
Unspecified	r696,394	672,838	779	West Germany 438,979; France 132,458.
Products:				
Nonrefractory	67,634	73,118	36	West Germany 30,519; Switzerland 16,760.
Refractory including nonclay brick	120,557	164,979	4,567	West Germany 39,322; Austria 27,001.
Cryolite and chiolite	854	1,336	--	Denmark 1,221.
Diamond:				
Gem, not set or strung carats	354,033	214,085	--	Belgium-Luxembourg 151,171; Israel 28,598.
Industrial do	221,140	183,934	--	Belgium-Luxembourg 115,007; Republic of South Africa 27,444.
Diatomite and other infusorial earth	5,597	5,019	881	France 2,348; West Germany 629.
Feldspar, fluorspar, related materials:				
Feldspar	r17,655	13,866	--	France 4,440; Brazil 3,460.
Fluorspar	105,531	84,322	--	France 29,993; Spain 20,665.
Unspecified	29,247	24,997	--	Norway 14,354; Canada 9,267.
Fertilizer materials:				
Crude, n.e.s	4,098	4,031	--	France 2,500.
Manufactured:				
Ammonia	340,973	440,299	--	U.S.S.R. 380,596; Austria 32,303.
Nitrogenous	138,870	158,987	91	West Germany 46,859; France 22,009.
Phosphatic	171,516	131,981	--	Tunisia 43,615; France 34,668; Israel 32,135.
Potassic	705,363	552,262	4	Israel 131,235; West Germany 79,688.
Unspecified and mixed thousand tons	875	644	439	Tunisia 79; West Germany 41.
Graphite, natural	1,279	4,046	--	West Germany 2,145; Austria 495.
Gypsum and plaster	20,961	21,864	1,209	Austria 17,009; West Germany 1,155.
Lime	531	277	NA	NA.
Magnesium compounds: Magnesite	108,662	72,035	408	Greece 37,597; Austria 12,872.
Mica:				
Crude including splittings and waste	1,089	1,261	358	India 103.
Worked including agglomerated splittings	352	372	46	Belgium-Luxembourg 113; France 86.
Nitrates, crude	4,118	429	--	Chile 152.
Phosphates, crude thousand tons	1,740	1,293	120	Morocco 668; Israel 210.
Pigments, mineral:				
Iron oxides and hydroxides, processed	20,776	19,032	328	West Germany 13,892; France 2,102.
Potassium salts, crude	16,982	12,719	--	France 11,485; West Germany 1,234.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material kilograms	93,790	148,255	--	Brazil 41,380; West Germany 17,364.
Quartz crystal, piezoelectric do	9,548	7,310	--	West Germany 6,959.
Synthetic do	7,908	7,218	--	Switzerland 4,451; France 1,316.
Pyrite, unroasted	291,010	252,901	--	U.S.S.R. 99,060; Norway 87,640.
Salt and brine	305,538	176,485	--	Tunisia 99,133; France 44,557.

See footnotes at end of table.

Table 3.—Italy: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	2,332	1,627	--	Romania 809; Belgium-Luxembourg 269.
Sodium carbonate, natural and manufactured	202,146	73,093	--	Romania 18,995; Switzerland 14,127.
Sodium hydroxide	80,173	81,564	--	France 65,245; West Germany 10,676.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	r696	603	2	Spain 127; Finland 107.
Worked	4,723	4,578	16	Spain 1,341; France 606.
Dolomite, chiefly refractory-grade	1,644	1,287	NA	NA.
Gravel and crushed rock	16,211	14,386	--	France 6,287.
Limestone other than dimension	42	168	NA	NA.
Quartz and quartzite	52,219	43,152	--	Switzerland 31,071; West Germany 5,236.
Sand other than metal-bearing thousand tons	1,255	1,166	--	France 697; Belgium-Luxembourg 276.
Sulfur:				
Elemental:				
Crude including native and by-product	603,280	476,015	--	Canada 290,344; France 89,340.
Colloidal, precipitated, sublimed	1,297	1,010	--	West Germany 866; Yugoslavia 40.
Sulfuric acid	5,389	14,364	--	West Germany 8,905; Belgium-Luxembourg 2,682.
Talc, steatite, soapstone, pyrophyllite	24,046	25,842	--	Austria 15,286; France 5,757.
Other:				
Crude	111,343	80,355	3,424	U.S.S.R. 33,687; Greece 11,309; Republic of South Africa 10,465.
Slag and dross, not metal-bearing	3,694	5,737	--	West Germany 1,056.
Oxides and hydroxides of barium, magnesium, strontium	974	1,287	NA	NA.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	31,924	24,455	--	West Germany 4,531; Austria 4,065; Hungary 3,505.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	913	1,143	1,047	NA.
Carbon: Carbon black	22,960	28,111	1,366	France 16,017; West Germany 6,437.
Coal:				
Anthracite thousand tons	16,517	18,465	9,003	West Germany 2,278; Australia 1,063; Poland 1,992.
Briquets of anthracite and bituminous coal	518	87,003	--	West Germany 564; France 350.
Lignite including briquets	110,999	61,760	39	West Germany 40,913; Yugoslavia 17,869.
Coke and semicoke	100,239	120,399	--	France 69,157; West Germany 31,477.
Gas, natural million cubic feet	459,712	544,150	--	Netherlands 272,933; U.S.S.R. 271,217.
Gas, manufactured thousand 42-gallon barrels	12,793	(1)	NA	NA.
Peat including briquets and litter	47,258	52,061	54	West Germany 25,069; U.S.S.R. 18,641.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	653,079	621,098	--	Saudi Arabia 231,144; Libya 80,206.
Refinery products:				
Liquefied petroleum gas do	6,473	8,156	(1)	Saudi Arabia 3,017; West Germany 1,120.
Gasoline, motor do	16,791	18,103	1	Saudi Arabia 4,357; Libya 2,066; Kuwait 1,712.
Mineral jelly and wax do	289	191	5	West Germany 72; Hungary 39.
Kerosine and jet fuel do	874	489	3	Trinidad 215; Algeria 177.
Distillate fuel oil do	24,482	13,517	1	Romania 4,481; United Kingdom 1,480.
Lubricants do	1,404	1,666	117	Spain 339; U.S.S.R. 327; France 192.
Residual fuel oil do	91,416	99,147	2,224	Venezuela 14,968; France 13,137.
Bitumen and other residues do	1,679	1,325	1,209	Albania 114.
Bituminous mixtures do	14	11	1	France 4; Sweden 2.
Petroleum coke do	4,515	5,359	4,011	United Kingdom 404; West Germany 221.

See footnotes at end of table.

Table 3.—Italy: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Tars and other crude chemicals derived from coal, gas, and petroleum	409,711	367,254	98,037	Canada 96,922; Yugoslavia 46,045; Spain 40,888.

rRevised. NA Not available.
1Less than 1/2 unit.
2Includes arsenic.

COMMODITY REVIEW

METALS

Aluminum.—According to reports from the Ente Mineraria Sarda (EMSA), discovery of a bauxite deposit was made at Almedo, about 20 kilometers from Sassari, Sardinia, on the Monte Rosso Mountain. Total reserves were reported at 70 million tons. The grade of bauxite was not mentioned except to say that 20 million tons have the same characteristics as Australian bauxite. The deposit is near the surface, and the ore is soft. Authorities expect costs not to exceed $20 per ton of bauxite produced.[2] Production was planned for 1984 and when normal production is achieved Italy should be self-sufficient in bauxite, which would save approximately $100 million per year in imports.

During 1982, the Government of Italy approved financial aid to the aluminum industry totaling $160 million. In addition, a long-term plan for restructuring the industry was examined.

Copper.—The first large 45,000-ton-per-year copper refinery will be built in Italy. The Government approved a plan by Societá per Azioni Minero-Metallurgiche (SAMIM) to build a $37 million copper refinery at Porto Marghera, near Venice. The site was chosen to include some of the facilities of the zinc plant closed recently. Employment should reach 200 persons when the plant becomes fully operational.

Iron and Steel.—Financial difficulties persisted in the Government-owned sector of the steel industry; the private segment of the industry was also affected by world recession. Implementation of the Government's 1981 steel plan by Finsider started during 1982. Finsider closed the Bagnoli steel plant near Naples as part of the plan, but later was induced to rescind the closing and make arrangements for modernization of the plant. In the two Teksid Aciai S.p.A. plants, Corso Mortara 7 Works and the Avigliana Works, both near Turin, various facilities were closed. The effect of closures will be to lower steelmaking capacity from 1.1 million to 580,000 tons per year, hot-strip mill capacity by 375,000 tons per year, hot-rolled sheet mill capacity by 50,000 tons per year, cold-reduced strip mill capacity by 110,000 tons per year, and roughing mill hourly capacity from 125 to 65 tons.

The privately owned Bresciani plants were making efforts to alleviate the difficult economic situation in the steel sector. These producers, located generally in northern Italy, began modifying their rolling mill practices and electric-furnace operations. In the effort to economize, computers were being installed to save energy and were used in stock management, deliveries, and in administrative and accounting procedures. A strong movement was begun by the leading Brescianis to consolidate the Italian private sector. The aim was to create a union that could better resist pressures from the Government and from the European Economic Community.

Lead and Zinc.—During 1982, the bulk of mine production of lead and zinc came from mines operated by SAMIM, a subsidiary of the Government-owned ENI, and Pertusola.

In the vicinity of the Masaua Mine in Sardinia, owned by SAMIM, exploration on the Marx and Nebida deposits confirmed important reserves of lead-zinc ores. Development of the San Giovanni Mine continued. Sinking of a shaft was completed and construction of a centrally located flotation

plant was underway.

At the Funtana Raminosa copper-lead-zinc mine in Sardinia, also owned by SAMIM, a test run of all mine facilities was completed and regular production started. At Fenice Campane, development of a mine and construction of a flotation plant was near completion and production of ore and lead and zinc concentrates was scheduled to start in 1983. At the Rajbl Mine, mining is by open pit. However, the Rajbl deposit extends to depth, and development of an underground mine was underway during 1982. Output from the underground mine should eventually replace production of about 300,000 tons of ore per year from the opencast mine.

The Salafossa Mine, operated by Pertusola, became operational again in 1982. The mine had been closed in 1980 after a ground slide damaged the flotation plant.

Mercury.—The Monte Amiata Mines stopped production of mercury again in September because of low demand.

NONMETALS

Asbestos.—The Balangero Mine, owned by Amiantifera Balangero S.p.A., had difficulty in selling its product. At yearend, about 20,000 tons of fiber remained unsold at the processing plant. At the mine, mining was limited to the lower levels, and the movable crusher was transferred from level 580 to level 654.

Potash.—At the Milena Mine in Sicily, a 1,325-meter-long incline was completed. To assure proper ventilation the new incline is connected to the surface with two ventilation shafts. At the Realmonte Mine, drifting continued on the two levels into a richer formation, containing more than 15.5% K_2O. In addition, a new crushing installation was completed underground. Preparations to replace trucks with a conveyor belt for transporting ore to the surface were in an advanced stage at yearend.

Pyrite.—At the Bochegiano Mine, development continued. Ventilation equipment was installed, a skip for moving ores and personnel was operational at yearend, and air-conditioning equipment was installed in the hottest areas of the mine. On the surface all components needed for producing cement fill were completed.

To ensure a uniform grade of pyrite delivered to SAMIM's Casone sulfuric acid plant, a new facility for upgrading the sulfur content of pyrite was commissioned.

Talc.—At the Fontane Mine, Piedmont, owned by Talco Graphite Valchisone S.p.A., a mining method using cement fill was introduced after several years of trial.

MINERAL FUELS

Italy remained largely dependent on imports of fuels to meet its energy demand, although domestic output of lignite and natural gas was of some importance to the country's economy.

Natural Gas and Petroleum.—After long negotiations, agreement was concluded on deliveries of natural gas from Algeria to Italy through underwater pipelines between Tunisia and Sicily. Some reports indicated a price of $4.41 per million British thermal units.

Montedison S.p.A. confirmed an oil discovery in Sicilian waters. The Wega-3 well, located 23 kilometers off the Ragusa coast in southern Sicily, tested at the rate of 10,000 barrels per day of crude oil. The well is at a depth of water of 125 meters and is 2,360 meters deep. The oil formation is of Jurassic age, and of 15.5 API degrees with 2.5% sulfur. Reportedly, reserves total 10 million tons of crude oil.

During 1982, a total of 376,000 meters of holes was drilled; seismic profiles were 17,200 kilometers long onshore and 6,200 meters offshore.

In the spring, Sarnim S.p.A. (75% Gulf and 25% Mobil) announced the closure of the 100,000-barrel-per-day refinery at Retanico near Milan because of serious economic difficulties.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Italian lire (Lit) to U.S. dollars at the average rate of Lit1,000=US$1.00.

The Mineral Industry of Japan

By John C. Wu[1]

The overall state of the 1982 Japanese economy was characterized by a 3% growth in real gross national product (GNP), a 1.6% increase in labor productivity, a 2.4% unemployment rate, a 2.7% inflation rate, and a $6.9 billion merchandise trade surplus.

Unlike the 1981 growth in GNP, which was boosted by the strength of exports, the 1982 growth in GNP was supported by strong domestic private demand. According to the Economic Planning Agency, Japan's GNP in 1975 constant dollars was estimated at $814.8 billion,[2] and the GNP in current dollars was estimated at $1,060 billion for the year. The 3% growth in GNP was less than the 5.2% anticipated by the Government; nevertheless, the performance was better than the 1.8% growth in GNP for the United States, 1.2% for the Federal Republic of Germany, 0.6% for the United Kingdom, and 1.4% for France, as reported by the International Monetary Fund.[3]

The small increase in labor productivity was due to the modest increase in the output of the manufacturing industry, which was attributed to a substantial increase in production by the electric machinery industry. However, this increase was offset by the lower level of production in steel and stagnant production in the transportation and precision machinery sectors. Because of the lower level of production in major industries, the unemployment rate rose. According to the Labor Ministry, the ratio of job offers to job seekers fell from 0.68 in 1981 to 0.61 in 1982. Japan's total labor force was 57.74 million, of which 1.36 million were unemployed in 1982. Employment in Japan's basic industries, including iron and steel, aluminum, and construction, suffered most of the cutback.

The modest increase in consumer prices reflected a stable price of fresh foods and durable goods. The lower level of foreign trade reflected a reduction in exports owing to a substantial decline in exports of machinery and transport equipment and a reduction in imports because of a significant drop in imports of crude oil and petroleum products.

Although the overall performance of the Japanese economy was impressive when compared with that of other advanced industrial nations in 1982, the Japanese basic-material industries continued to face the problems of high energy costs, stagnant domestic demand, and increased foreign competition. Scaling down output capacity, cutting back employment, and shifting the energy source away from oil remained the major means of coping by the basic-material industries. The involved basic-material industries included aluminum, iron and steel, fertilizer materials, cement manufacturing, petroleum refining, and petrochemical industries.

Following the recommendation of the Ministry of International Trade and Industry (MITI) for the so-called structurally depressed industries, Japan's aluminum smelting capacity was reduced to 740,000 tons per year with one smelter going out of business and reorganization in several aluminum companies. A further cut in output capacity by 510,000 tons per year of ammonia, 800,000 tons per year of urea, 700,000 barrels per day of oil refining, 2 million tons per year of ethylene, and 49,000 tons per year of vinyl chloride became inevitable.

Although Japan's iron and steel industry has made progress in energy savings and productivity increases, the industry remained depressed because of the weak domestic demand and increased competition from the Republic of Korea and Taiwan. For the first time in a decade, Japan's crude steel output was under 100 million tons. More than 20 older and smaller blast furnaces for the production of pig iron were shut down, and crude steel output was at 60% installed

capacity. As a result, more than 7,000 production workers were separated from the industry. The situation in Japan's ferroalloys industry was even more severe because of higher production costs and increased imports of low-priced ferroalloys from the Republic of South Africa, Brazil, Norway, and China.

Japan's cement output was down to 80 million tons for the first time since 1977 because of the reduced domestic demand. However, the industry has completed its conversion of energy source from oil to coal and has added several new suspension preheater kilns.

The activities of nonferrous and minor metals sectors remained stagnant, reflecting weak demand in domestic and world markets with a significant cutback in titanium sponge and cobalt metal production. However, a number of important discoveries of gold, lead, and zinc were made in Japan during 1982.

Japan's mining industry continued to decline in terms of number of employees and number of mines in metal mining and nonmetal mining operations. According to MITI, the number of employees in metal mining operations was reduced from 12,511 in 1979 to 10,499 in 1982, while the number in nonmetal mining operations was reduced from 18,968 in 1979 to 17,869 in 1982. The number of mines in metal mining operations was reduced from 79 in 1979 to 72 in 1982, while the number in nonmetal mining operations was reduced from 730 in 1979 to 700 in 1982.

The output of Japan's mining operations was sufficient only in some nonmetallic minerals such as limestone, dolomite potter stone, silica sand and stone, fire clay, and pyrophyllite. Other nonmetallic minerals and most metallic minerals were heavily dependent on imports. Japan's import dependency of selected minerals and metals was estimated for the year as follows: 100% for antimony, bauxite, cobalt, columbium, fluorspar, graphite, mica, nickel, phosphate rock, potash, strontium, tantalum, and titanium ore; 90% to 99% for asbestos, copper, chromium, gold, iron ore, manganese, molybdenum, platinum-group metals, and tin; 86% for salt; 78% for vanadium; 73% for lead; 68% for silver and tungsten; and for mineral fuels, 99.8% for crude oil and 83% for coal.

To secure short-term supplies of metals vital to Japan's machinery and electronic industries, the actual purchasing of five metals for a 10-day stockpiling program was carried out by the Special Metal Stockpiling Association in December. Of the $46.2 million (Y11.5 billion) budgeted, a total of $30 million was spent in purchasing cobalt, chromium, molybdenum, nickel, and tungsten. About $18.4 million was spent in purchasing nickel from New Caledonia, Indonesia, and the Philippines for 1,148 tons of nickel metal, 1,620 tons of nickel in ferronickel, and 175 tons of nickel in nickel oxide sinter. About $9 million was spent in purchasing chromium from the Republic of South Africa and the Philippines for 14,551 tons of chromium in ferrochromium grading 25% Cr. About $651,000 was spent in purchasing cobalt from Australia and the Philippines for 50 tons of cobalt metal. In addition, about $2.2 million was scheduled to be spent in purchasing 47 tons of tungsten in concentrate from the Republic of Korea and 395 tons of molybdenum in concentrate from Chile by the end of fiscal year 1982.[4]

In November, a 2-day symposium on rare metals sponsored by MITI with delegates from the United States and Japan was held in Tokyo. The symposium resulted in an understanding by both sides for opening of mutual contacts, exchanging data, and possible cooperation in technology and development of resources. According to Japanese sources, a cooperative arrangement was reached between the two countries for establishing a system to supply mineral resources in case of export stoppage by rare metal producers, for Japanese cooperation in developing U.S. mineral resources by providing development funds, and for establishment of an information exchange system concerning national stockpiling of rare metals.[5] Both sides also agreed to hold a second symposium in the United States in 1983.

To further secure supplies of rare metals, MITI planned to expand its exploration and development projects overseas.

PRODUCTION

Production activity of Japanese mining and mineral processing sectors continued the 1981 downward trend and reached the lowest level of output in August 1982. Mining of the metallic minerals was affected by high production cost and low grade ore,

while nonmetallic mining was affected by reduced domestic demand. The deepening of the worldwide economic recession and the lower growth in the Japanese economy forced many industries of the mineral processing sector to cut back production and capacity.

Most of the metal and nonmetal mine production decreased. However, domestic mine production of minerals remained small compared to Japan's raw material requirements of the mineral processing sector.

Japan's aluminum production was cut back further to less than one-half of the 1981 output, while the output of crude steel continued the 3-year downward trend to under 100 million tons. Metal production of copper, gold, and silver increased slightly, while that of lead, zinc, nickel, and magnesium declined slightly. Metal production of titanium and cobalt was cut back substantially. The output of cement and fertilizer materials also declined substantially because of the reduced demand in domestic and export markets.

Japan's production of mineral fuels remained insignificant. The domestic production of coal, oil, and natural gas accounted for 18%, 0.2%, and 0.6%, respectively, of Japan's primary energy supply. Because of the reduced demand for refined petroleum products, Japan's petroleum refining capacity was scaled down further to about 5 million barrels per day of oil.

Despite the low-level activity of the mineral industry, Japan remained the world's second largest producer of crude steel, a leading producer of cement and chemical fertilizer materials, and a major producer of refined copper, refined lead and zinc, titanium sponge, refined petroleum products as well as petrochemical products.

Table 1.—Japan: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Alumina, gross weight ____ thousand tons__	1,502	1,545	1,936	1,344	959
Metal:					
Primary:					
Regular grades ____ do____	r1,054	r1,006	r1,087	765	347
High-purity ____ do____	4	4	4	6	4
Secondary ____ do____	660	768	800	840	761
Antimony:					
Oxide ____	5,427	6,079	6,482	6,238	6,446
Metal ____	1,017	512	356	390	260
Arsenic, white (equivalent of arsenic acid) ____	91	182	284	e300	e300
Bismuth ____	624	458	338	478	486
Cadmium ____	2,531	2,597	2,173	1,977	2,034
Chromium:					
Chromite, gross weight ____	8,696	11,905	13,610	10,959	11,129
Metal ____	2,885	3,158	3,621	3,625	3,785
Cobalt metal ____	1,864	2,653	2,867	2,421	1,942
Columbium and tantalum: Tantalum metal ____	41	55	r58	53	44
Copper:					
Mine output, metal content ____	71,951	59,100	52,553	51,513	51,031
Metal:					
Blister and anode:					
Primary ____	854,500	853,700	889,500	937,000	998,900
Secondary ____	51,400	67,700	40,300	43,000	45,900
Total ____	905,900	921,400	929,800	980,000	1,044,800
Refined:					
Primary ____	854,474	853,693	889,497	929,967	948,158
Secondary ____	104,596	130,007	124,795	120,153	126,816
Total ____	959,070	983,700	1,014,292	1,050,120	1,074,974
Germanium:					
Oxide ____	17	15	16	12	10
Metal ____	11	10	13	11	7
Gold:					
Mine output, metal content thousand troy ounces__	145	128	102	99	105
Metal ____ do____	1,357	1,311	1,217	1,214	1,271
Indium metal ____ do____	209	289	482	482	482

See footnotes at end of table.

Table 1.—Japan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS —Continued					
Iron and steel:					
Iron ore and iron sand concentrate:					
Gross weight ——— thousand tons	595	460	477	442	362
Iron content ——— do	361	284	294	274	225
Roasted pyrite concentrate (50% or more Fe) do	487	432	318	308	344
Metal:					
Pig iron and blast furnace ferroalloys do	78,589	83,826	87,041	80,048	77,658
Electric furnace ferroalloys:					
Ferrochrome	274,421	365,490	402,997	306,104	328,480
Ferromanganese	455,729	603,019	569,147	567,746	538,355
Ferronickel	198,482	303,716	276,829	244,135	214,523
Ferrosilicon	270,052	319,553	303,754	234,524	192,372
Silicomanganese	303,249	299,680	310,714	282,852	269,379
Ferrochromium-silicon[2]	9,208	12,623	20,531	10,469	9,845
Other:					
Calcium silicon	1,896	3,349	3,859	2,590	3,834
Ferrocolumbium	1,193	1,207	1,159	825	1,039
Ferromolybdenum	3,904	3,406	4,367	3,056	3,413
Ferrotungsten	243	251	242	362	329
Ferrovanadium	3,193	4,628	3,526	4,063	4,465
Unspecified	9,637	9,298	10,360	3,167	2,309
Total[3]	1,531,207	1,926,220	1,907,485	1,659,893	1,568,343
Steel, crude ——— thousand tons	102,105	111,748	111,395	101,675	99,548
Semimanufactures, hot-rolled:					
Of ordinary steels ——— do	79,625	89,075	88,888	79,797	78,206
Of special steels ——— do	11,669	12,522	12,872	13,281	13,660
Lead:					
Mine output, metal content	56,489	46,929	44,746	46,922	45,882
Metal, refined:					
Primary	228,442	221,247	220,934	226,242	223,858
Secondary	53,537	53,376	74,187	80,046	71,490
Magnesium metal:					
Primary	11,162	11,368	9,252	5,667	5,555
Secondary	10,938	16,382	23,872	28,436	21,670
Manganese:					
Ore and concentrate:					
Gross weight	104,147	87,929	79,579	86,696	81,442
Manganese content	28,657	23,224	19,065	20,953	21,157
Oxide	31,131	36,110	39,487	44,296	45,990
Metal	6,463	4,029	4,431	4,232	3,873
Molybdenum:					
Metal content of concentrate	r74	r70	r56	74	e97
Metal	309	409	388	388	392
Nickel metal:					
Refined	21,636	25,031	24,798	23,791	23,327
Ni content of ferronickel	57,564	75,970	73,566	63,008	60,030
Total	79,200	101,001	98,364	86,799	83,357
Platinum-group metals:					
Palladium metal ——— troy ounces	24,021	22,495	28,968	25,748	27,862
Platinum metal ——— do	10,176	12,142	12,366	10,521	15,411
Rare-earth metals:					
Lanthanum oxide	105	151	188	227	107
Cerium metal	403	491	670	e600	e600
Selenium, elemental	481	510	471	428	410
Silicon metal	r14,100	r15,200	r15,800	11,900	9,700
Silver:					
Mine output, metal content thousand troy ounces	9,664	8,680	8,603	9,010	9,831
Metal, primary ——— do	38,782	39,104	37,828	40,252	41,573
Tellurium, elemental	68	56	69	62	63
Tin:					
Mine output, metal content	603	660	549	561	533
Metal, smelter	1,141	1,251	1,319	1,315	1,296
Titanium:					
Slag	175	180	NA	NA	NA
Metal	9,174	13,190	13,961	24,938	16,849
Tungsten:					
Mine output, metal content	775	746	668	667	635
Metal	1,479	1,736	2,055	1,820	1,779

See footnotes at end of table.

Table 1.—Japan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS —Continued					
Uranium metal ____ kilograms	3,602	3,377	5,218	[e]5,000	[e]5,000
Zinc:					
Mine output, metal content	274,629	243,354	238,108	242,042	250,079
Oxide	56,785	61,514	63,497	64,735	58,874
Metal:					
Primary	767,949	789,352	735,187	670,162	662,380
Secondary	24,770	26,973	49,917	50,272	46,037
NONMETALS					
Asbestos	5,746	3,502	3,897	[e]3,500	[e]4,000
Barite	70,967	55,722	55,916	56,369	59,355
Bromine, elemental[e]	12,000	12,000	12,000	12,000	12,000
Cement, hydraulic ____ thousand tons	84,882	87,803	87,958	84,832	80,400
Clays:					
Bentonite	[e]400,000	[e]400,000	548,328	511,781	483,483
Fire clay	1,475,608	1,432,241	[r]1,547,085	1,455,619	1,331,797
Kaolin	227,134	218,137	228,255	210,858	197,346
Feldspar and related materials:					
Feldspar	42,119	37,548	29,782	25,620	30,157
Aplite	377,548	394,240	302,749	350,123	356,728
Gypsum ____ thousand tons	5,794	6,273	6,105	6,137	6,363
Iodine, elemental	6,000	6,250	6,525	6,862	7,180
Lime: Quicklime ____ thousand tons	9,058	9,628	9,350	8,026	[e]8,000
Nitrogen: N content of ammonia ____ do	2,454	2,323	2,149	1,850	1,652
Perlite:[e]	73,000	75,000	77,000	75,000	75,000
Salt, all types ____ thousand tons	1,073	[r]1,079	[r]1,112	1,100	[e]1,100
Sodium compounds, n.e.s.:					
Sodium carbonate	1,161,570	1,354,442	1,355,433	1,177,695	1,160,989
Sodium sulfate	320,177	338,467	310,743	284,677	255,972
Stone, crushed and broken:					
Dolomite ____ thousand tons	6,087	6,119	6,206	5,787	5,016
Limestone ____ do	172,543	182,781	184,780	176,702	168,302
Sulfur:					
S content of pyrites ____ do	327	300	311	293	276
Byproduct:					
Of metallurgy ____ do	1,296	1,350	1,300	1,236	[e]1,200
Of petroleum ____ do	1,105	1,241	1,173	1,080	[e]1,000
Talc and related materials:					
Talc	139,491	120,403	121,670	114,466	99,901
Pyrophyllite	1,555,434	1,588,461	1,627,128	430,585	1,386,193
Vermiculite[e]	15,000	16,000	17,000	17,000	17,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black ____ thousand tons	489	538	575	557	503
Coal:					
Anthracite ____ do	1	3	10	34	32
Bituminous coal[4] ____ do	18,548	17,640	18,017	17,653	17,576
Lignite ____ do	39	32	27	[e]30	[e]30
Total ____ do	18,588	17,675	18,054	17,717	17,638
Coke including breeze:					
Metallurgical ____ do	40,546	43,189	45,146	44,864	46,520
Metallurgical breeze ____ do	[e]2,000	2,000	2,318	2,378	
Gashouse including breeze ____ do	3,342	3,226	3,494	3,448	3,261
Fuel briquets, all grades ____ do	421	479	453	376	[e]400
Gas, natural:					
Gross[5] ____ million cubic feet	93,255	85,250	77,593	74,245	72,305
Marketed ____ do	90,440	83,455	75,545	71,594	70,440
Natural gas liquids:					
Natural gasoline[e] thousand 42-gallon barrels	37	37	37	37	37
Liquefied petroleum gas from natural gas (field plants only)[e] ____ do	300	300	300	300	300
Peat[e]	60	60	60	60	60
Petroleum and refinery products:					
Crude ____ thousand 42-gallon barrels	3,963	3,522	3,169	2,868	2,937
Refinery products:					
Gasoline:					
Aviation ____ do	170	138	88	101	101
Other ____ do	209,449	215,910	214,614	219,168	222,489
Jet fuel ____ do	26,074	26,669	28,839	28,273	27,109
Kerosine ____ do	187,073	193,537	178,718	174,548	169,825

See footnotes at end of table.

Table 1.—Japan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Distillate fuel oil thousand 42-gallon barrels	122,975	135,652	135,633	134,476	113,581
Residual fuel oil ---do---	780,226	779,628	697,507	601,412	528,299
Lubricants ---do---	11,440	12,277	12,636	11,806	10,774
Other:					
Asphalt and bitumen ---do---	31,219	30,618	28,411	27,078	27,078
Liquefied petroleum gas ---do---	48,645	52,413	47,067	47,475	45,890
Naphtha ---do---	120,057	118,563	110,512	92,403	71,804
Paraffin ---do---	1,088	1,195	1,101	1,101	1,025
Petroleum coke ---do---	440	503	692	717	761
Unfinished oils ---do---	38,300	45,362	44,557	12,076	NA
Refinery fuel and losses ---do---	110,768	83,441	[6]110,411	113,002	118,708
Total ---do---	1,687,924	1,695,906	1,610,786	1,463,636	1,337,444

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through Aug. 1, 1983.

[2]For reasons not evident in sources, these figures are reported as negative numbers. (See also footnote 3.)

[3]Sum of listed detail as reported, but adding quantity bearing footnote 2 as positive numbers. Japanese sources provide the following totals for ferroalloy output in the years indicated: 1978—1,512,791; 1979—1,900,974; 1980—1,866,423; 1981—1,638,955; and 1982—1,548,653. These totals represent the sum of listed detail using the quantities bearing footnote 2 as negative numbers, thereby not only omitting the footnoted numbers, but actually subtracting them from the sum of all other alloys. The reason for this procedure in source publications is not explained.

[4]Includes coking coal and steam coal.

[5]Includes output from gas mines and coal mines.

[6]May include some additional unfinished oils.

TRADE

Japan's total value of two-way merchandise trade dropped 8.3% to $270.8 billion, with reduction in values of both exports and imports reflecting the depressed world market. As a result, merchandise trade surplus fell to $6.9 billion. However, Japan's merchandise trade balance was ranked the best in the world's trade community.

Export earnings fell to $138.8 billion with a significant reduction in exports of machinery, transport equipment, and other manufactured goods. Exports of motor vehicles dropped to $24.6 billion, nonelectric machinery dropped to $20.3 billion, and electric machinery dropped to $19.7 billion. Exports of iron and steel fell to $15.6 billion; nonferrous metals and metal manufactures fell to $5.6 billion; scientific, medical, and optical instruments fell to $4.8 billion; stereo equipment and audio and video tape recorders and players declined to $6.2 billion; and chemicals declined to $6.4 billion.

Total imports also fell 7.9% to $131.9 billion with reduced imports in all categories except chemicals, which rose 5.2% to $6.8 billion. Imports of mineral fuels dropped 9.6% to $65.6 billion with a 4.7% increase in coal to $5.8 billion, a 12.4% drop in crude oil and petroleum products to $51.4 billion, and a slight increase in liquefied natural and petroleum gas to $8.4 billion. Imports of metal ore, concentrate, and scrap materials fell 7.2% to $6.8 billion, of which iron ore and concentrate was $3.6 billion; copper ore and concentrate, $1.4 billion; and other nonferrous ore, concentrate, and scrap, $1.4 billion. Other principal imports were logs and lumber, $4.5 billion; grains and cereal products, $4.0 billion; fish and fish products, $3.9 billion; nonferrous metals, $3.9 billion; and nonelectric machinery, $3.8 billion.

The United States remained the major trade partner of Japan. In 1982, Japanese exports to the United States dropped 5.9% to $36.3 billion, while imports from the United States also dropped 4.4% to $24.2 billion. Other major trade partners, based on the value of two-way trade, were Saudi Arabia, $27.1 billion; Indonesia, $16.3 billion; Australia, $11.5 billion; United Arab Emirates, $9.5 billion; China, $8.9 billion; and the Republic of Korea, $8.1 billion.

Table 2.—Japan: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	832	902	358	Taiwan 439.
Aluminum:				
Ore and concentrate	--	40	--	All to Republic of Korea.
Oxides and hydroxides	398,544	412,100	1,091	Canada 188,338; Egypt 121,595; Republic of Korea 61,353.
Metal including alloys:				
Scrap	858	453	15	Republic of Korea 215; Taiwan 208.
Unwrought	7,644	12,160	4	Australia 7,780; Republic of Korea 3,175.
Semimanufactures	73,567	114,326	44,199	China 13,618; Indonesia 11,256; Republic of Korea 6,472.
Antimony: Metal including alloys, all forms	30	15	(2)	Mainly to Indonesia.
Beryllium: Metal including alloys, all forms kilograms	5	1	--	Mainly to United Kingdom.
Bismuth: Metal including alloys, all forms	242	253	49	U.S.S.R. 80; West Germany 33; Poland 29.
Cadmium: Metal including alloys, all forms	229	14	1	United Kingdom 6; Saudi Arabia 3.
Chromium:				
Ore and concentrate	5,678	607	--	Republic of Korea 545; Singapore 38.
Oxides and hydroxides	3,368	2,268	471	Republic of Korea 735; Taiwan 576; North Korea 150.
Cobalt: Oxides and hydroxides	85	13	--	Taiwan 4; Republic of Korea 2; Netherlands 2; Vietnam 2.
Columbium and tantalum: Metal including alloys, all forms, tantalum	40	26	11	West Germany 10; Netherlands 3.
Copper:				
Sulfate	254	340	--	Taiwan 274; Indonesia 42.
Metal including alloys:				
Scrap	206,255	38,434	4,918	Taiwan 14,143; Indonesia 8,529; Republic of Korea 4,405.
Unwrought	10,662	4,873	2,035	Republic of Korea 2,291; Taiwan 402.
Semimanufactures	192,441	190,068	34,251	Taiwan 27,985; Hong Kong 26,064; Singapore 18,386.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	99	53	--	Republic of Korea 40.
Pyrite, roasted value	--	$554	--	All to Republic of Korea.
Metal:				
Scrap	159,366	186,783	10,331	Republic of Korea 94,446; Taiwan 29,517; Hong Kong 19,820.
Pig iron, cast iron, related materials	14,571	11,896	2,095	Taiwan 1,973; Republic of Korea 1,468; Australia 1,441.
Ferroalloys:				
Ferromanganese	40,271	34,866	7,000	North Korea 16,549; Republic of Korea 4,480; Malaysia 2,708.
Unspecified	30,268	28,971	15,503	Netherlands 5,488; North Korea 2,069; Republic of Korea 1,391.
Steel, primary forms thousand tons	3,950	2,854	451	Republic of Korea 722; Taiwan 358; China 157.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	7,595	6,808	1,111	Saudi Arabia 1,099; Republic of Korea 539; Hong Kong 421.
Universals, plates, sheets:				
Universals, plates and sheets do	7,492	7,099	606	China 1,131; Taiwan 636; Indonesia 556.
Tinned plates and sheets do	890	746	150	China 132; Singapore 66; Philippines 54.
Other coated plates and sheets do	2,118	2,102	785	Nigeria 115; Saudi Arabia 114; China 87.
Hoop and strip do	692	596	62	China 102; Indonesia 60; Taiwan 42.
Rails and accessories do	144	144	73	Brazil 17; Republic of Korea 9; Iran 6.
Wire do	291	275	104	Saudi Arabia 11; Hong Kong 10; Iraq 8.
Tubes, pipes, fittings do	6,578	6,201	2,565	U.S.S.R. 1,262; Saudi Arabia 414.
Castings and forgings, rough do	26	34	18	Singapore 3.
Lead:				
Ore and concentrate	6,139	7,810	--	U.S.S.R. 5,787; North Korea 2,023.

See footnotes at end of table.

Table 2.—Japan: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead —Continued				
Oxides	51	108	--	Singapore 58; Republic of Korea 28; Philippines 7.
Metal including alloys, all forms	10,506	4,184	3	Taiwan 2,003; Republic of Korea 1,032.
Magnesium: Metal including alloys, all forms	97	72	--	Republic of Korea 31; Indonesia 13; Taiwan 13.
Manganese:				
Ore and concentrate	1,855	991	--	Republic of Korea 486; Pakistan 375.
Oxides	22,944	27,540	12,077	Indonesia 3,422; Tanzania 1,353; U.S.S.R. 1,261.
Mercury 76-pound flasks	9,340	6,917	2,604	Netherlands 2,319; Republic of Korea 623.
Metelloids:				
Phosphorus	105	59	(2)	Taiwan 18; North Korea 10; Thailand 10; Vietnam 10.
Selenium	342	247	33	Netherlands 71; India 41; United Kingdom 25.
Molybdenum: Metal including alloys, all forms	37	54	(2)	U.S.S.R. 24; Hungary 18.
Nickel:				
Ore and concentrate	--	3,600	--	All to Sweden.
Metal including alloys, all forms	2,031	1,804	603	Taiwan 216; North Korea 213; Republic of Korea 192.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	189	178	(2)	Taiwan 129; United Kingdom 20.
Silver:				
Waste and sweepings value, thousands	r$2,218	$9	--	All to Switzerland.
Metal including alloys, unwrought and partly wrought thousand troy ounces	7,084	4,981	256	United Kingdom 2,806; Taiwan 554; Republic of Korea 455.
Tin:				
Oxides	49	24	1	China 15.
Metal including alloys, all forms	1,262	439	--	Taiwan 131; Republic of Korea 110; Hong Kong 40.
Titanium:				
Oxides	16,768	16,353	2,676	Taiwan 3,991; China 3,871; Republic of Korea 2,917.
Metal including alloys, all forms	8,070	10,034	4,291	United Kingdom 2,725; Netherlands 2,219.
Tungsten: Metal including alloys, all forms	216	212	65	U.S.S.R. 51; Taiwan 27.
Zinc:				
Oxides	455	480	--	Thailand 144; Republic of Korea 106; Vietnam 77.
Metal including alloys, all forms	45,157	55,582	5,871	Taiwan 10,459; Philippines 10,374; Republic of Korea 8,797.
Other:				
Ores and concentrates	109	86	--	Republic of Korea 49; Thailand 20; Singapore 16.
Oxides and hydroxides	1,736	2,616	312	Republic of Korea 599; Indonesia 362; Tunisia 340.
Ashes and residues	13,273	46,431	1,808	Singapore 28,918; Bahrain 10,500.
Pyrophoric alloys	76	89	27	France 21; Libya 8; Philippines 8.
Base metals including alloys, all forms	5,852	3,245	1,647	Netherlands 456; West Germany 403; Australia 110.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,030	1,916	6	Taiwan 873; Republic of Korea 599; Hong Kong 210.
Artificial: Corundum	15,560	15,138	45	Republic of Korea 8,911; Taiwan 3,382; Australia 1,333.
Dust and powder of precious and semi-precious stones thousand carats	1,045	1,692	1,078	Hong Kong 360; Republic of Korea 125.
Grinding and polishing wheels and stones	6,297	7,336	1,149	Singapore 917; Thailand 778; Hong Kong 701.
Asbestos, crude	428	680	--	Republic of Korea 358; Malaysia 216; China 68.

See footnotes at end of table.

Table 2.—Japan: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Barite and witherite	1,902	4,768	--	Cuba 3,888; U.S.S.R. 630; Philippines 250.
Boron materials:				
Crude natural borates	620	1,424	--	Taiwan 945; Republic of Korea 479.
Oxides and acids	219	147	(2)	Republic of Korea 101; Taiwan 25.
Cement thousand tons	8,786	10,011	489	Saudi Arabia 2,498; Kuwait 2,443; Singapore 1,368.
Chalk	--	243	--	Republic of Korea 226.
Clays and clay products:				
Crude, unspecified	77,643	59,961	--	Taiwan 32,362; Republic of Korea 13,195.
Products:				
Nonrefractory[3]	46,470	50,399	8,064	Singapore 12,242; Hong Kong 11,371.
Refractory including nonclay brick	275,797	317,051	3,373	China 81,475; Indonesia 39,239; Republic of Korea 34,228.
Cryolite and chiolite value	$2,381	$1,732	--	All to Republic of Korea.
Diamond:				
Gem, not set or strung carats	450,471	324	5	Republic of Korea 233; Israel 62; Hong Kong 15.
Industrial do	11,562	2,098	1,300	United Kingdom 407; Republic of Korea 216; Philippines 175.
Diatomite and other infusorial earth	1,891	2,321	--	Taiwan 824; Vietnam 750; U.S.S.R. 220.
Feldspar, fluorspar, related materials:				
Feldspar	22,889	18,766	4	Taiwan 16,660; Indonesia 1,363.
Fluorspar	625	326	--	Indonesia 163; Malaysia 80; Taiwan 58.
Fertilizer materials: Manufactured:				
Ammonia	153,578	9,717	--	Philippines 5,013; Republic of Korea 3,014; Hong Kong 826.
Nitrogenous thousand tons	1,554	1,436	10	China 950; Thailand 107; Sri Lanka 61.
Phosphatic	23,477	35,472	--	Bangladesh 16,908; Burma 7,000; Fiji 6,500.
Potassic	6	8,218	4	North Korea 4,000; China 3,908.
Unspecified and mixed	203,188	75,338	592	Thailand 41,300; Nepal 7,285; Indonesia 6,501.
Graphite, natural	1,745	1,620	65	Taiwan 713; Czechoslovakia 484; Republic of Korea 114.
Gypsum and plaster	6,370	7,628	14	Taiwan 2,308; Republic of Korea 2,269; Indonesia 1,062.
Halogens	5,707	5,442	2,078	West Germany 891; United Kingdom 884; France 580.
Lime	20,076	25,079	--	Papua New Guinea 19,593; Australia 3,143; Singapore 2,000.
Magnesium compounds:				
Magnesite	113,440	88,487	8,764	Republic of Korea 19,909; Australia 14,542; Netherlands 10,620.
Oxides and hydroxides	5,822	5,860	1,320	Taiwan 1,047; U.S.S.R. 850; West Germany 764.
Mica, all forms	951	1,145	27	Hong Kong 503; Taiwan 360; Indonesia 61.
Pigments, mineral:				
Natural, crude	40	61	--	Singapore 31; Taiwan 16.
Iron oxides and hydroxides, processed	19,492	14,875	1,648	Taiwan 6,781; Republic of Korea 1,392; Mexico 1,293.
Precious and semiprecious stones other than diamond:				
Natural kilograms	41,033	42,833	532	Republic of Korea 36,347; Taiwan 4,330.
Synthetic do	43,030	43,933	6,139	Malaysia 14,619; Republic of Korea 10,384; Taiwan 2,953.
Salt and brine	2,299	1,173	637	North Korea 198; Republic of Korea 85; Indonesia 72.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	7,083	5,299	168	Australia 1,312; Taiwan 1,207; Republic of Korea 1,078.
Sodium carbonate, natural and manufactured	96,578	61,318	8	Indonesia 25,950; Philippines 18,428; Taiwan 6,243.
Sodium hydroxide	380,677	287,165	20	Australia 251,297; Thailand 19,727; Republic of Korea 8,797.
Stone, sand and gravel:				
Dimension stone	2,202	1,640	251	Republic of Korea 609; Taiwan 345; Hong Kong 207.

See footnotes at end of table.

Table 2.—Japan: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Dolomite, chiefly refractory-grade	6,890	3,446	--	Indonesia 1,510; Taiwan 1,051; Philippines 880.
Gravel and crushed rock	90,797	96,378	12	Australia 92,800.
Limestone other than dimension thousand tons	1,159	1,263	(2)	Australia 1,202.
Quartz and quartzite	1,276	675	NA	Republic of Korea 250; Taiwan 103; Malaysia 92.
Sand other than metal-bearing	3,738	8,018	--	Taiwan 4,677; Saudi Arabia 1,003; Iraq 670.
Sulfur:				
Elemental:				
Crude including native and byproduct	364,268	231,326	--	Republic of Korea 173,246; Taiwan 54,879.
Colloidal, precipitated, sublimed	1,029	174	--	Republic of Korea 58; Iran 32; Indonesia 27.
Dioxide[4]	81	65	--	Republic of Korea 25; Taiwan 19; Philippines 13.
Sulfuric acid	301,751	576,682	11,133	Mexico 229,895; Philippines 143,091; Turkey 59,108.
Talc, steatite, soapstone, pyrophyllite	1,691	1,923	3	Taiwan 507; Iran 500; Republic of Korea 211.
Other:				
Crude	12,080	11,385	34	Republic of Korea 4,084; Taiwan 3,597; Indonesia 536.
Slag and dross, not metal-bearing	417,829	428,622	2,214	Singapore 170,904; Philippines 157,418; Republic of Korea 67,934.
Oxides and hydroxides of barium, magnesium, strontium	14,898	1,713	152	Indonesia 654; Thailand 318; Republic of Korea 161.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	4,396	6,827	3	Republic of Korea 2,167; Saudi Arabia 1,376; Iraq 854.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	31	21	--	Taiwan 19.
Carbon: Carbon black	15,941	13,246	106	Indonesia 3,816; Singapore 1,473; Republic of Korea 1,076.
Coal, all grades including briquets	70,726	55,004	--	Republic of Korea 46,242; Philippines 5,617; Cuba 1,594.
Coke and semicoke thousand tons	2,330	1,961	148	Romania 799; Philippines 151; Brazil 131.
Hydrogen, helium, rare gases	680	1,092	41	Taiwan 276; Iraq 129; Saudi Arabia 102.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	2	22	--	Thailand 20.
Gasoline do	56	60	--	Taiwan 33; Philippines 25.
Mineral jelly and wax do	633	592	34	Republic of South Africa 155; India 101; Republic of Korea 73.
Kerosine and jet fuel do	25	51	8	Republic of Korea 28; Australia 14.
Distillate fuel oil do	(2)	(2)	(2)	Mainly to Hong Kong.
Lubricants do	1,909	1,327	80	Republic of Korea 446; Taiwan 217.
Residual fuel oil do	(2)	1,547	16	Thailand 674; Hong Kong 327; Philippines 306.
Bitumen and other residues do	r122	157	--	Vietnam 61; Indonesia 51.
Bituminous mixtures do	--	18	--	Philippines 5; Indonesia 3; Yemen 2.
Petroleum coke do	149	226	151	Netherlands 58.
Unspecified do	116	104	2	Republic of Korea 38; Taiwan 36.
Tars and other crude chemicals derived from coal, gas, and petroleum	133,142	165,177	6,956	U.S.S.R. 66,800; Republic of Korea 40,952; Taiwan 10,574.

rRevised. NA Not available.
[1]Excludes exports under Japanese-U.S. Mutual Defense Agreement or for account of U.S. military forces.
[2]Less than 1/2 unit.
[3]Excludes mosaic tiles valued at $111,235,000 in 1980 and $103,338,000 in 1981.
[4]May contain some arsenic trioxide and pentoxide.

Table 3.—Japan: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium:				
Oxides and hydroxides	603	631	385	U.S.S.R. 235.
Metal including alloys, all forms	20	30	29	West Germany 1.
Alkaline-earth metals	99	162	148	China 9.
Rare-earth metals	42	8	2	France 3; China 2.
Unspecified	337	447	9	France 337; China 16.
Aluminum:				
Ore and concentrate thousand tons	5,708	4,352	--	Australia 2,562; Indonesia 1,072; Malaysia 631.
Oxides and hydroxides	735	640	2	Australia 636.
Metal including alloys:				
Scrap	275,696	204,863	151,934	Hong Kong 12,951; Canada 12,707; Australia 10,686.
Unwrought	910,085	1,129,322	266,325	Venezuela 161,607; Canada 116,152; New Zealand 108,574.
Semimanufactures	46,173	31,088	10,895	Romania 4,635; France 3,892; Argentina 1,906; Spain 1,306.
Antimony:				
Ore and concentrate	6,996	6,531	--	Bolivia 5,673; China 749.
Metal including alloys, all forms	1,563	2,366	--	China 2,253.
Beryllium:				
Oxides and hydroxides	85	91	90	China 1.
Metal including alloys, all forms kilograms	1,611	1,968	1,968	
Chromium:				
Ore and concentrate	950,039	743,937	--	Republic of South Africa 348,317; Philippines 150,945; India 142,140.
Oxides and hydroxides	2,286	2,379	1,061	West Germany 786; U.S.S.R. 451.
Cobalt:				
Oxides and hydroxides	292	227	7	Belgium 169; Canada 20; China 19.
Metal including alloys, all forms	r1,661	1,132	310	Belgium 246; Zaire 210.
Columbium and tantalum:				
Ore and concentrate	2,073	1,405	--	Canada 1,244.
Metal including alloys, all forms, tantalum	46	19	17	Taiwan 1.
Copper:				
Ore and concentrate thousand tons	3,104	3,338	488	Philippines 862; Canada 767; Papua New Guinea 301.
Matte and speiss including cement copper	2,574	--		
Sulfate	570	377	50	U.S.S.R. 120; China 117.
Metal including alloys:				
Scrap	49,929	51,866	28,314	Hong Kong 14,625; Taiwan 3,472.
Unwrought	290,803	331,425	7,577	Zambia 147,037; Peru 68,872; Chile 45,416.
Semimanufactures	3,330	3,264	2,126	Republic of Korea 572; West Germany 215.
Germanium: Metal including alloys, all forms kilograms	134	2,546	--	China 2,497.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	1,170	5,566	13	United Kingdom 2,112; Switzerland 1,886; U.S.S.R. 1,191.
Indium: Metal including alloys, all forms kilograms	3,017	891	54	Belgium 445; Netherlands 221.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite thousand tons	133,721	123,362	--	Australia 54,861; Brazil 27,165; India 15,636.
Metal:				
Scrap do.	2,986	1,791	1,132	Australia 264; U.S.S.R. 155.
Pig iron, cast iron, related materials do.	r782	1,086	--	China 794; Australia 67; North Korea 66.
Ferroalloys	477,293	503,024	5,600	Republic of South Africa 155,828; China 80,754; Brazil 61,361.
Steel, primary forms	522,466	725,616	286	Republic of Korea 617,724; Venezuela 83,962; Philippines 10,291.
Semimanufactures	32,525	27,723	3,335	Republic of Korea 12,866.
Lead:				
Ore and concentrate	258,634	255,765	26,725	Canada 115,155; Peru 54,825; Republic of South Africa 23,297.
Oxides	1,463	2,812	31	Mexico 2,440.

See footnotes at end of table.

Table 3.—Japan: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys:				
Scrap	5,020	2,668	930	Kuwait 620; Sudan 381; Australia 318.
Unwrought	90,712	67,472	1,162	Australia 15,822; North Korea 12,284; Peru 12,040.
Semimanufactures	382	390	382	Canada 6.
Magnesium: Metal including alloys, all forms	12,907	11,274	7,196	Norway 2,517; Canada 1,178.
Manganese:				
Ore and concentrate thousand tons	2,953	2,493	--	Republic of South Africa 1,361; Australia 433; India 390.
Oxides	762	921	3	Belgium 884.
Mercury 76-pound flasks	2,662	2,016	1	Mexico 801; Algeria 761; China 453.
Metalloids:				
Arsenic:				
Ore and concentrate	10	20	--	All from China.
Oxides and acids	716	451	--	France 318; Mexico 101.
Phosphorus:				
Elemental	14,018	15,764	6,514	Canada 4,848; China 2,600; U.S.S.R. 1,577.
Oxides and acids	79,068	85,949	595	Republic of South Africa 85,165.
Selenium kilograms	1,036	7,275	--	Sweden 4,000; Netherlands 2,000; Republic of Korea 1,275.
Silicon	62,990	58,977	8,457	China 10,098; Brazil 8,460; Republic of South Africa 6,458.
Tellurium kilograms	9,779	6,574	557	U.S.S.R. 6,000.
Unspecified	42	97	54	Sweden 18; U.S.S.R. 15.
Molybdenum:				
Ore and concentrate	20,379	16,290	8,499	Canada 4,713; Chile 2,402.
Oxides and hydroxides	826	660	660	
Metal including alloys, all forms	55	137	71	West Germany 30.
Nickel:				
Ore and concentrate thousand tons	3,950	3,463	--	New Caledonia 1,662; Indonesia 1,162; Philippines 638.
Matte and speiss	51,751	36,608	--	Indonesia 18,648; Australia 15,408.
Metal including alloys:				
Scrap	1,824	2,252	1,150	Taiwan 574; United Kingdom 387.
Unwrought	15,645	17,883	1,606	Canada 5,078; U.S.S.R. 3,191; Australia 2,849.
Semimanufactures	3,613	2,099	474	United Kingdom 1,164.
Platinum-group metals:				
Waste and sweepings value, thousands	$1,250	$861	--	Taiwan $836.
Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	766,824	950,680	111,266	U.S.S.R. 532,843; Republic of South Africa 180,032.
Platinum thousand troy ounces	1,010	1,210	229	Republic of South Africa 558; United Kingdom 208; U.S.S.R. 169.
Rhodium troy ounces	26,290	36,687	7,889	Republic of South Africa 13,655; U.S.S.R. 10,414.
Iridium, osmium, ruthenium do	27,533	39,429	5,054	Republic of South Africa 17,177; United Kingdom 15,867.
Unspecified do	23,468	17,148	2,744	West Germany 9,142; Switzerland 4,191.
Silver:				
Ore and concentrate	3,400	--		
Waste and sweepings value	$137,332	$146,853	--	Taiwan $102,934.
Metal including alloys, unwrought and partly wrought thousand troy ounces	19,090	14,159	565	Mexico 9,031; Peru 2,410; Australia 1,544.
Tin:				
Oxides	5	6	--	Australia 5.
Metal including alloys, all forms	31,155	30,298	8	Malaysia 18,517; Indonesia 6,514; Thailand 4,931.
Titanium:				
Ore and concentrate	409,080	323,057	--	Malaysia 156,729; Australia 72,548; India 54,449.
Oxides	4,098	3,833	66	Republic of Korea 986; Belgium 976; United Kingdom 554.
Slag	152,663	66,086	--	All from Republic of South Africa.

Table 3.—Japan: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tungsten:				
Ore and concentrate	3,480	2,256	--	Republic of Korea 507; Portugal 468; Australia 336.
Metal including alloys, all forms	135	164	3	Republic of Korea 139.
Uranium and/or thorium:				
Ore and concentrate	--	41	--	All from Niger.
Oxides and other compounds kilograms	839	808	--	U.S.S.R. 449; France 350.
Vanadium:				
Oxides and hydroxides	3,404	3,943	58	Republic of South Africa 2,848; China 857.
Zinc:				
Ore and concentrate	804,851	877,995	--	Canada 273,150; Australia 261,494; Peru 252,462.
Oxides	4,544	4,703	40	Republic of Korea 1,712; Taiwan 1,221; Singapore 1,012.
Metal including alloys, all forms	45,892	34,841	990	North Korea 19,308; Republic of Korea 7,580.
Zirconium:				
Ore and concentrate	190,109	157,733	21	Australia 135,810; Republic of South Africa 20,359.
Metal including alloys, all forms	103	60	18	France 33.
Other:				
Ores and concentrates	53	42	--	Zaire 30; China 12.
Oxides and hydroxides	2,148	1,786	121	China 662; Norway 432; Canada 221.
Ashes and residues	59,042	50,186	11,493	Philippines 15,491; Australia 9,823.
Pyrophoric alloys	7	10	7	United Kingdom 1.
Base metals including alloys, all forms	10	17	--	All from West Germany.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	4,344	5,145	1,316	India 3,270.
Artificial: Corundum	13,900	9,653	125	China 4,908; Brazil 2,058; India 1,989.
Dust and powder of precious and semi-precious stones, excluding diamond kilograms	67,258	65,270	--	West Germany 59,270.
Grinding and polishing wheels and stones	200	289	53	Italy 107; Austria 52; West Germany 41.
Asbestos, crude	305,408	237,963	11,636	Canada 101,777; Republic of South Africa 49,335; U.S.S.R. 38,130.
Barite and witherite	40,173	45,251	18	China 40,614; Thailand 4,597.
Boron materials:				
Crude natural borates	63,548	37,371	--	Turkey 33,750; U.S.S.R. 3,621.
Oxides and acids	17,262	17,396	12,413	U.S.S.R. 3,252; China 1,133.
Cement	4,149	3,098	1,453	Republic of Korea 1,000; Netherlands 360.
Chalk	3	2	2	
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	26,682	28,280	7,731	Republic of South Africa 18,001; India 2,498.
Kaolin	565,404	521,681	426,301	Republic of Korea 67,607; China 9,996; Malaysia 4,889.
Unspecified	288,221	257,955	99,341	China 102,194; Republic of Korea 27,529.
Products:				
Nonrefractory	23,446	16,563	578	Italy 5,853; Republic of Korea 4,432; West Germany 1,925.
Refractory including nonclay brick	8,578	9,907	1,119	Sweden 5,266; Republic of South Africa 1,649.
Cryolite and chiolite	230	197	--	Greenland 102; Denmark 95.
Diamond:				
Gem, not set or strung thousand carats	744	798	32	India 349; Israel 227; Belgium 102.
Industrial, excluding dust and powder do	681	635	163	Republic of South Africa 171; Zaire 87; Belgium 80.
Dust and powder do	20,275	21,354	12,002	Ireland 8,387.
Diatomite and other infusorial earth	7,464	9,429	9,418	Mexico 10.
Feldspar, fluorspar, related materials:				
Feldspar	5,568	4,981	18	China 2,785; India 945; Canada 620; Republic of Korea 550.
Fluorspar	487,455	428,314	--	China 257,701; Thailand 83,570; Republic of South Africa 77,150.

Table 3.—Japan: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials: Manufactured:				
Ammonia	25	6	6	
Nitrogenous	34,937	29,622	1,121	Chile 17,000; Norway 5,450; Republic of Korea 4,081.
Phosphatic	58,924	55,784	24,312	Republic of Korea 27,164; China 4,230.
Potassic ——— thousand tons	1,533	1,209	169	Canada 558; U.S.S.R. 167.
Unspecified and mixed	224,089	213,657	201,714	Republic of Korea 6,570; Israel 2,192.
Graphite, natural	69,605	52,697	91	China 21,645; Republic of Korea 19,305; North Korea 5,755.
Gypsum and plaster	33,235	203,138	1,027	Australia 161,418; Morocco 32,000; Thailand 8,500.
Halogens: Bromine and iodine	1,929	2,076	353	Israel 1,723.
Lime	20	(2)	--	Mainly from Thailand.
Magnesium compounds:				
Magnesite	180,450	199,356	14	North Korea 121,617; China 76,087.
Oxides and hydroxides	271	755	44	China 457; West Germany 125.
Mica, all forms	11,660	12,598	1,913	India 5,910; Canada 1,563; China 1,084.
Nitrates, crude	3,000	4,000	--	All from Chile.
Phosphates, crude ——— thousand tons	2,762	2,256	1,314	Morocco 606; Jordan 220.
Pigments, mineral:				
Natural, crude	2,096	6,059	--	Austria 4,471; China 1,564.
Iron oxides and hydroxides, processed	3,725	5,370	1,753	West Germany 2,366; China 1,014.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material thousand kilograms	606	724	55	Brazil 334; Angola 185.
Industrial ——— kilograms	88	121	(2)	Mainly from China.
Meerschaum, amber, jet	179	(2)	--	Mainly from Spain.
Synthetic	62	69	39	West Germany 2.
Salt and brine ——— thousand tons	7,480	6,510	(2)	Mexico 3,026; Australia 2,929.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	111	66	48	West Germany 18.
Sodium carbonate, natural and manufactured	4	270	--	Mainly from Romania.
Sodium hydroxide	67,977	53,176	5,886	Republic of Korea 24,353; Canada 22,781.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	593,183	508,505	31,405	India 150,662; Republic of Korea 138,207; China 55,269.
Worked	74,801	73,539	331	Republic of Korea 46,399; Italy 9,345; Taiwan 7,171.
Dolomite, chiefly refractory-grade	214,977	206,832	2,741	Republic of Korea 111,715; Taiwan 62,435; Philippines 29,347.
Gravel and crushed rock	326,788	366,937	36	Taiwan 350,733.
Limestone other than dimension	698	336	--	Mainly from France.
Quartz and quartzite	92,933	105,057	380	India 35,794; China 33,457; Republic of Korea 25,105.
Sand other than metal-bearing	890,169	778,626	553	Australia 398,060; Taiwan 257,530; Malaysia 111,635.
Sulfur:				
Elemental: Colloidal, precipitated, sublimed	818	467	461	West Germany 5.
Dioxide ——— kilograms	9	--		
Sulfuric acid ——— do	631	--		
Talc, steatite, soapstone, pyrophyllite	501,086	441,604	5,520	China 323,416: Australia 60,441; North Korea 26,371.
Other:				
Crude	249,487	181,974	4,586	Republic of Korea 106,253; Spain 33,225; Philippines 12,907.
Slag and dross, not metal-bearing	140,538	151,122	(2)	India 71,288; Republic of Korea 47,703.
Oxides and hydroxides of barium, magnesium, strontium	r405	363	1	Italy 284; China 77.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	6,325	7,540	1,094	Belgium 2,936; Canada 2,505.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,460	2,700	2,641	Australia 34; Sweden 19.
Carbon: Carbon black	9,021	10,076	6,789	Canada 804; Australia 587; West Germany 556.

See footnotes at end of table.

Table 3.—Japan: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite thousand tons	1,191	873	15	China 442; Vietnam 196; North Korea 126.
Bituminous:				
Heavy coking coal, less than 8% ash do	18,259	17,845	9,810	Australia 5,669; Canada 1,457; U.S.S.R. 653.
Heavy coking coal, more than 8% ash do	28,286	30,963	6,149	Australia 15,472; Canada 8,015; China 890.
Other do	20,492	28,589	7,732	Australia 13,664; Republic of South Africa 4,131; China 1,409.
Lignite including briquets do	34	28	1	Australia 23.
Coke and semicoke do	53	37	15	Australia 14.
Hydrogen, helium, rare gases	248	296	295	NA.
Peat including briquets and litter	8,964	13,292	69	Canada 12,103; Finland 852.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	1,543,915	1,398,982	--	Saudi Arabia 520,656; Indonesia 226,949; United Arab Emirates 196,527.
Partly refined do	39,702	20,108	--	Saudi Arabia 9,584; Kuwait 4,512; Indonesia 3,303.
Refinery products:				
Liquefied petroleum gas do	307,533	316,866	12,466	Indonesia 104,165; Saudi Arabia 64,053; Brunei 60,618.
Gasoline do	56,884	62,666	217	Saudi Arabia 21,392; Singapore 17,732; Kuwait 8,672.
Mineral jelly and wax do	104	52	39	China 7.
Kerosine and jet fuel do	3,974	9,686	363	Singapore 4,514; China 1,078; Venezuela 853.
Distillate fuel oil do	18,744	16,920	168	Saudi Arabia 7,854; China 2,428.
Lubricants do	62	572	244	Singapore 142; Netherlands Antilles 124; Republic of Korea 52.
Residual fuel oil do	69,624	52,736	1,689	Indonesia 23,521; Singapore 13,895.
Bitumen and other residues do	21	21	15	Taiwan 4.
Bituminous mixtures do	--	17	10	Republic of Korea 4; United Kingdom 2.
Petroleum coke do	13,606	12,714	10,723	China 891; Canada 466.
Unspecified do	r323	99	87	France 6; Singapore 4.
Tars and other crude chemicals derived from coal, gas, and petroleum	238,604	296,922	70,781	Republic of Korea 138,604; China 77,165.

rRevised. NA Not available.
[1]Excludes imports under Japanese-U.S. Mutual Defense Agreement or for account of U.S. military forces.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The depressed and ailing aluminum industry of Japan took a steeper slide into financial crisis as the cost of production and imports of foreign aluminum continued to increase. Sumikei Aluminum Industries Ltd., the smallest of the six smelters, went out of business in May, while Showa Light Metal Co. Ltd. became a joint venture company of Showa Denko K.K. and Conzinc Riotinto of Australia Ltd. (CRA) (through its subsidiary Comalco Pty. Ltd.) in April. Sumitomo Aluminum Smelting Co. Ltd., the largest smelter, was near total liquidation before it was reorganized and became a member of the Sumitomo Group in September. The industry's annual operating capacity, excluding the shutdown and frozen facilities, was reduced to 761,244 tons in April from 1,136,460 tons in January and was further reduced to 743,304 tons in July. During the last quarter, the industry was operating at 35% of its operating capacity.

By yearend 1982, the following plants were closed or remained shut down: Naoetsu of Mitsubishi Light Metal Industries Co. Ltd.; Niigata of Nippon Light Metal Co. Ltd.; Kitakata and Omachi of Showa Light Metal; Isoura of Sumitomo Aluminum Smelting; and Sakata of Sumikei Aluminum Industries.

According to industry sources, the electric power cost to Japanese smelters was estimated at 80 mills per kilowatt hour compared with a world average of 22 mills. The cost of electric power alone was estimated to be 41% of the total production cost in Japan. During 1982, the price of domestically produced aluminum averaged about $1,250 per ton compared with the world market price of $1,050 to $1,100 per ton. According to Japanese industry sources, the Japanese aluminum industry could remain competitive in the world market only if the electric power cost could be reduced to less than 43 mills per kilowatt hour.[6]

Imports of primary aluminum jumped to a new record of 1,289,671 tons. The major suppliers were the United States, Venezuela, Canada, New Zealand, Australia, the United Arab Emirates, and Bahrain. Imports of primary aluminum were equivalent to 78.8% of Japan's domestic demand for primary aluminum in 1982 compared with 62.6% in 1981, while domestic production was equivalent to only 21.4% in 1982 compared with 49.2% in 1981. Domestic demand for primary aluminum increased to 1.64 million tons in 1982, about the same level as that of 1980, as the rolling mill sector increased its consumption by 7.7% to 1.28 million tons. However, demand for primary aluminum from other major sectors, including aluminum casting and wire and cable, dropped by 6.6% to 166,200 tons. Japan exported only 4,223 tons of aluminum in 1982 compared with 8,319 tons in 1981.

Despite a drastic cutback in domestic production of primary aluminum, the overall stocks of aluminum remained high at 750,015 tons at yearend 1982 compared with 768,166 tons in 1981. Aluminum stocks at producers' plants dropped 36.1% to 196,776 tons; those at dealers' warehouses also dropped 2.9% to 220,306 tons. However, the stocks at fabricators' plants rose 18.6% to 250,804 tons. Aluminum stocks held by the Light Metal Stockpiling Association rose to 29,284 tons in March 1982 from 21,990 tons at the end of 1981. As a result of the Government assistance program, the association purchased an additional 52,845 tons for the stockpile from five smelters at the end of November. At the end of 1982, the aluminum stockpile of the Light Metal Stockpiling Association totaled 82,129 tons.

In September, an emergency loan of $240 to $320 million to rescue the domestic aluminum industry from total collapse was planned by MITI after the Japan Aluminum Federation asked the Government to purchase 150,000 to 200,000 tons of surplus aluminum from the smelters for the Government stockpile. In November, a relief program was approved by the Government. Under the program, a $180 million, Government-guaranteed loan was to be raised from city banks by the Metal Mining Agency of Japan, which in turn would lend the fund to the Light Metal Stockpiling Association for purchasing 110,000 tons of primary aluminum from the five smelters. In addition, the Government would subsidize the interest payment of 2% with the smelter to pay 6.5%. The association purchased 52,845 tons of aluminum from the smelters at a price of $1,514 per ton at the end of November. The remaining 57,155 tons was expected to be purchased by the end of March 1982.[7]

Under a tariff quota system introduced by MITI in 1981, the total primary aluminum imported by Japanese smelters duty free in fiscal year 1982 was 393,000 tons, and the Government approved 424,000 tons for import during fiscal year 1983. Primary aluminum imported by Japanese smelters was all from Japanese overseas smelter projects in New Zealand, Canada, Venezuela, the United States, and Indonesia. A 9% tariff was imposed by the Government for all other imports of primary aluminum in 1982.

In the fiscal year ending in March, all smelters except Mitsui Aluminum Co. Ltd. (which operated a smelter with a coal-fired powerplant at Miike) incurred loss. The combined accumulated deficit of the five smelters excluding Sumikei Aluminum was estimated at $294.3 million. According to the general view of the industry, the 1982 financial crisis was a direct result of rising electric cost and competition from foreign suppliers, especially from new Middle East producers who sold most of their aluminum in the world market at dumping prices. In June, the Japan Aluminum Federation recommended to MITI a survival plan. The recommendations included increases in the Government stockpiling of primary aluminum, readjustment of electric costs, favorable financial aid, and tax incentives to reduce the industry's accumulated deficit and excess capacity.

In 1982, progress was made by Japanese aluminum smelters on downstream processing. According to MITI, for the fiscal year ending in March, capital investments in rolling and other fabricating plants were to increase by 53.6% to $270 million. The collaboration by Showa Aluminum Industries Co. Ltd. and CRA reflected the contin-

uing trend of Japanese smelters to go downstream with a stable supply coming from abroad. Showa Aluminum reportedly had entered into the fabricating business by acquiring a 37.25% interest in Sky Aluminum Co., an aluminum fabricator of the Showa Group, in 1982.

In August, the New Aluminum Refining Research Center was established by the five smelters to develop new aluminum production technology based on a blast furnace process that will consume much less energy. The five smelters reportedly were expected to invest $600,000, while MITI will provide $800,000 as a Government subsidizing fund. The new organization was expected to be reorganized in early 1983 after Ishikawajima-Harima Heavy Industries Co. and Kobe Steel Ltd. agreed to participate in the new research project. A $1 million pilot plant with a capacity of 1 ton per year will be constructed at the Miike plant of Mitsui.[8]

The construction of a 320,000-ton-per-year capacity aluminum smelter at Bancarena in northern Brazil and an 800,000-ton-per-year Alumina do Norte do Brasil S.A. (ALUNORTE) alumina plant reportedly might be delayed or suspended for several years because of the depressed world aluminum market, financial difficulties in Japanese smelters, and Brazil's large financial debt. Nippon Amazon Aluminum Co. of Japan, a consortium of 31 Japanese companies and the Government Overseas Economic Cooperation Fund, reached an agreement with the 2 Brazilian joint venture firms, Alumínio Brasileiro Ltda. and ALUNORTE to lend $124 million to the project in early 1982. The total project cost was estimated at $2.5 to $2.6 billion. By yearend 1982, the Brazilian concern reportedly had invested $473 million in the project, and about 20% of the construction work was completed.

Copper.—Mine production remained at the same level as 1981; however, output of refined copper, including primary and secondary, reached another record. Imports of ore and concentrate also increased to 3.6 million tons in 1982 from 3.3 million tons in 1981. In November, Shimokawa Mining Co. Ltd. reportedly shut down its Shimokawa copper-zinc mine in Hokkaido because of insufficient ore reserves and continuing losses.

The share of domestic ore in overall refined copper production declined further to 3.5% in 1982 from 4.2% in 1981, while the share of imported ore and concentrate rose to 84.7% in 1982 from 84.4% in 1981, and the share of copper scrap and other materials of secondary production also rose to 11.8% in 1982 from 11.4% in 1981.

In 1982, imports of copper ore and concentrate were mainly from the Philippines, Canada, the United States, Papua New Guinea, Chile, and Indonesia. During 1982, Japan also imported 295,794 tons of refined copper in cathodes, mainly from Zambia, Chile, and Peru. Imports of blister totaled 77,880 tons. The major suppliers of blister copper were Peru, Namibia, and the Republic of South Africa.

According to MITI, domestic consumption of refined copper declined 1.8% to 1,330,212 tons in 1982. Consumption by wire and cable fabricators rose 5% to 911,315 tons, while consumption by brass mills dropped 6.4% to 396,696 tons. Exports of refined copper increased by 16.5% to 44,640 tons. The main buyers of Japanese refined copper were China, the Republic of Korea, Taiwan, and Indonesia.

The overall stocks of refined copper rose by 49.7% to 250,453 tons at yearend 1982 over that of 1981. Stocks held by the producers were 114,798 tons; distributors, 45,011 tons; and fabricators, 90,644 tons. Since October 1982, all stocks held by the Japanese Metallic Mineral Stockpiling Association were sold back to the producers.

During the first 9 months, the copper refining industry was operating at an average of 84.3% capacity. However, during the last 3 months of 1982, the average operating rate rose to 90%. The increased operating rate reflected higher output level as well as lower operating capacity because of repair and maintenance in some refineries.

According to the MITI survey, Japanese copper smelting and refining capacities by company and by method of process during April 1981 to September 1982 were as shown in table 4.[9]

The expansion program of Sumitomo Metal Mining Co. Ltd. at Toyo was scheduled for completion in May 1983. Upon completion, Sumitomo's copper refining capacity at Toyo will be increased to 192,000 tons per year. In October 1982, Nippon Mining Co. Ltd. completed its expansion program at Saganoseki in Ooita Prefecture. The refining capacity was increased to 300,000 tons per year.

In September, Mitsubishi Metal Corp. and Kennecott Minerals Co., a wholly owned subsidiary of Standard Oil Co. of Ohio, reached an agreement to spend $100 million for expansion and modernization of the copper smelter at Chino Mines Co. in

Hurley, N. Mex. Upon completion of the project, the smelter's annual capacity was expected to increase to 453,600 tons from 272,200 tons. The overall expansion and modernization program of copper mining, milling, and smelting at Kennecott's Chino Mine was estimated at $380 million. In 1981, Chino Mines was formed by Kennecott, with two-thirds equity, and Mitsubishi, which paid $116 million for one-third equity. Mitsubishi has the right to take one-third of the copper production.

Table 4.—Japan: Copper smelters and refineries

(Metric tons)

Company and plant location	Annual capacity		Process
	Smelting	Refinery	
Dowa Mining Co. Ltd.:			
Kosaka	52,200	60,000	Flash smelting.
Okayama	[1]15,120	[1]12,000	
Furukawa Electric Co. Ltd.:			
Nikko	--	48,000	
Furukawa Mining Co. Ltd.:			
Ashio	50,400	--	Flash smelting.
Hibi Kyodo Smelting Co. Ltd.:			
Tamano	132,000	102,000	Do.
Mitsubishi Metal Corp.:			
Naoshima	168,000	163,200	Reverberatory smelting.
Mitsui Mining & Smelting Co. Ltd.:			
Hibi	62,400	--	Blast furnace smelting.
Takehara	--	87,600	
Nippon Mining Co. Ltd.:			
Hitachi	84,000	192,000	Flash smelting.
Saganoseki	240,000	168,000	Do.
Onahama Smelting Co. Ltd.:			
Onahama	188,400	234,000	Reverbatory smelting.
Rasa Industries Co. Ltd.:[2]			
Miyako	31,200	--	Blast furnace smelting.
Sumitomo Metal Mining Co. Ltd.:			
Besshi (Toyo)	168,000	180,000	Flash smelting.
Total	1,191,720	1,246,800	

[1]Shut down.
[2]The smelter was sold to Godo Shigen Sangyo Co. in October 1981.

Gold and Silver.—Mine production of both gold and silver increased in 1982. The increased mine production was due primarily to the higher milling recovery rate. Domestic mine production of gold and silver was equivalent to 8.3% and 23.6%, respectively, of metal refining production. The overall metal refining production, including primary and secondary, by source of raw materials in 1980-82 was as follows:

Year	Production (thousand troy ounces)	Share of production (percent)		
		Domestic ore	Imported ore	Scrap and other
Gold:				
1980	1,217	17.8	72.4	9.8
1981	1,214	15.3	73.3	11.4
1982	1,271	14.2	73.1	12.7
Silver:				
1980	37,828	21.6	50.8	27.6
1981	40,252	23.1	46.8	30.1
1982	41,573	21.8	50.3	27.9

To meet the domestic demand for gold, Japan imported 4.49 million troy ounces of gold in 1982 compared with a record high of 5.38 million troy ounces in 1981. Switzerland, the United Kingdom, and the U.S.S.R. remained the dominant suppliers of Japan's gold imports. The decline in gold imports was attributed mainly to a 20% drop in private hoarding. Despite the opening of the Tokyo Gold Exchange on March 23, demand for gold by private hoarding began to level off in April because of the higher gold prices and delay in the introduction of a new tax system that will prevent bank depositors

from taking advantage of certain tax-free savings accounts in Japanese banks. During 1982, Japan increased its silver imports by 18.6% to 15.8 million troy ounces. The major suppliers were Mexico, 49.5%; Peru, 19.9%; North Korea, 18.8%; and Australia, 9.7%.

Domestic demand for gold fell 11.3% to 6.27 million troy ounces, of which 50% was for private hoarding, 22% for jewelry, 18% for electronic communication apparatus and gold plate, 6% for dental and medical, and 4% for other. Spot sales of gold to nonresidents (foreign gold dealers) amounted to 2.1 million troy ounces, while exports of gold rose sharply to 579,000 troy ounces in 1982 from 239,000 troy ounces in 1981. Domestic demand for silver increased by 5.7% to 63.2 million troy ounces in 1982 from that of 1981. The manufacturers of silver nitrate for photographic film remained the dominant consumer of silver, accounting for 58% of total domestic demand; electrical contact points, 10%; caustic silver, 9%; rolling of tube, sheet, and bar, 5%; brazing alloys (silver solder), 5%; and others, 13%. Exports of silver fell 16% to 2.6 million troy ounces in 1982.

Sumitomo Metal Mining reportedly was expected to start development of the Hishikari gold mine discovered in Kagoshima, Kyushu, in 1981. Based on the samples collected from 18 test borings at the mine, the company estimated the deposit has ore reserves of 1.5 million tons with an average gold content of 80 grams per ton of ore. Sumitomo Metal Mining was expected to spend $16 to $17 million for developing the Hishikari Mine. According to the development plans, when completed, the project would have a daily processing capacity of 200 tons of ore and an annual capacity of 4 to 6 tons of gold metal.[10]

Iron and Steel.—Japan's crude steel production decreased to under 100 million tons as a result of a continuing decline in domestic demand for steel and stagnant exports.

Japan regained second place in world steel output with the production of pig iron and crude steel accounting for 17.5% and 15.4%, respectively, of total world production.

Production of pig iron by blast furnace was 99.8%, and by electric and other furnaces, 0.2%. The output of pig iron by blast furnace represents only 56.8% of the industry's 136.5-million-ton-per-year capacity with only 40 out of 65 existing blast furnaces operating. Production of crude steel by basic oxygen furnace was 73.4%, and by ultra-high-power electric furnace, 26.6%. The output of crude steel by basic oxygen furnace represents only 56.5% of the industry's 129.2-million-ton-per-year capacity, while the output of crude steel by ultra-high-power electric furnace was equivalent to 92.1% of the industry's 28.8-million-ton-per-year capacity. The total output of crude steel represents only 63% of the industry's 158-million-ton-per-year capacity in 1982.

During 1982, four more continuous-casting machines (two for slabs and two for blooms and billets) were put into operation. By yearend, the industry had a total of 152 continuous-casting machines with an annual capacity of 78,918,000 tons. Over the past 10 years, the percentage of crude steel processed by continuous-casting machines increased from 20.7% in 1973 to 78.7% in 1982. The percentage of continuous-casting processing of rolled ordinary steel and rolled specialty steel in 1973 and 1979-82 was as follows:[11]

Year	Continuous-casting ratio		Average
	Ordinary steel	Specialty steel	
1973	22.1	10.1	20.7
1979	55.5	31.7	52.0
1980	63.3	38.3	59.5
1981	74.8	49.9	70.7
1982	82.8	59.0	78.7

Japan's continuous-casting ratio was the highest among the world's major steel producers, followed by the Federal Republic of Germany, 59.8%; France, 59.1%; the United Kingdom, 36.4%; the United States, 27.6%; and the U.S.S.R., 12.2% (1981). According to Japanese industry sources, the increase in the continuous-casting ratio has resulted not only in an increase in product yield rate by about 6% but also in energy savings of about 2% over the past decade.

Mine production of iron ore and pyrite

concentrate remained very small compared to total consumption of iron ore, pellets, and iron sands, which amounted to 109.7 million tons in 1982. To meet the iron and steel industry's requirements, Japan imported 121.8 million tons (wet basis) of iron ore, which included sinters, pellets, and briquets. The principal suppliers were Australia, 44%; Brazil, 22%; India, 13%; the Republic of South Africa, 5%; Chile, 5%; and the Philippines, 3%.

Consumption of raw materials by the iron and steel industry included 97 million tons of iron ore, 10.4 million tons of pellets, 2.3 million tons of iron sand, 38.9 million tons of iron and steel scrap, 62.6 million tons of coking coal, 42.7 million tons of coke, 1.3 million tons of manganese ore, 868,000 tons of ferruginous manganese ore, and 13.4 million tons of limestone. As a result of the industry's energy-saving programs and the decrease in crude steel production, consumption of energy declined further in 1982. Consumption of fuel oil dropped by 19.6% to 13,441,000 barrels, and consumption of electricity also declined from 62.3 billion (revised) kilowatt-hours in 1981 to 60.5 billion kilowatt-hours in 1982. Oxygen consumption dropped 4.7% to 4.9 billion cubic meters.

Because of the cutback in steel production, the industry's production work force was reduced by 7,494 to 184,986 at yearend. In October, under the Japanese Employment Insurance Law, a special subsidy program, the retraining program, was approved by the Labor Ministry to displaced workers mainly from the 24 idle blast furnace sections of the 9 major integrated steel companies. Under the program, the displaced workers were to be rotated off their regular work for 2 to 3 days per month for retraining in nonrelated fields. The Government was to pay one-half of workers' wages up to $24.75 per day as well as $2.38 per day of the training costs. The program was approved for 1 year.[12]

The reduction in steel output and sales coupled with increased labor costs and lower operating rates resulted in a sharp decline in the profits of Japan's major integrated steel manufacturers. Nippon Steel Corp., the world's largest steel producer, which produces about 30 million tons of steel per year, suffered a 57% drop in profits for the first half of the fiscal year ending September 1982. For the fiscal year ending March 1983, Japan's integrated steel companies, which included Nippon Steel, Nippon Kokan K.K., Kawasaki Steel Corp., and Sumitomo Metal Industries Ltd., reportedly were anticipating a total loss of over $160 million.[13]

Japan's estimated apparent steel consumption declined to 69.4 million tons in 1982. The slow pace of private housing and nonresidential construction, a slight decline in automotive and machinery production, and a sharp drop in shipbuilding were the major factors for the continuing downward trend of domestic demand for steel. Domestic orders for ordinary steel declined 2.5% to 48.6 million tons, while orders for specialty steel dropped 1.2% to 7 million tons in 1982.

Exports of iron and steel products totaled 29.5 million tons, of which 26.5 million tons was ordinary rolled steel products, 1.5 million tons was special rolled steel products, 1.5 million tons was pig iron, ferroalloys, cast-iron pipes, clad steel sheets, steel ingots, semimanufactured steel, and wire products of secondary steel. In 1982, exports of iron and steel products to the United States decreased 32.7% to 4.2 million tons, while exports to Saudi Arabia rose 73.1% to 3.2 million tons, and exports to China and the U.S.S.R., rose 32% to 2.9 million tons and 18% to 2.4 million tons, respectively. Other major importers of Japanese iron and steel products were Indonesia, 1.5 million tons; Singapore, 1.3 million tons; and Malaysia, Taiwan, and the Republic of Korea, 1.1 million tons each. Despite a slight increase in export volume, export earnings of iron and steel products decreased 5.9% to $16 billion in 1982, owing to the depreciation of the yen, which caused the average export unit price for all steel products to fall from $582 per ton in 1981 to $542 per ton in 1982.

Japan's imports of iron and steel increased 26.4% to 3.98 million tons, of which 1.89 million tons was ordinary steel products, 1.38 million tons was pig iron, and 710,000 tons was ferroalloys and other steel products. The major suppliers were the Republic of Korea, 37%, and China, 21%. However, the Republic of Korea remained the dominant supplier of heavy and medium plates and hot-rolled coils, followed by Taiwan.

Plant and equipment investments by Japan's steel industry reached $4.4 billion and accounted for 9.2% of all industries' capital investments. Special emphasis of the industry's capital investment was focused on installation of energy-saving facilities, replacement of blast furnaces and rolling mills, and plants and equipment to produce high-value-added steel products.

These high-value-added products include seamless pipes and tubes for oil production, precoated sheets and textured sheets for fabrication, one-side coated sheet for automotive production, galvanized plate for manufacture of electric appliances and steel furniture, and corrosion-resistant, surface-treated steel.

Lead and Zinc.—Mine production of lead decreased but mine production of zinc increased slightly in 1982. Domestic ore production of lead and zinc accounted for 21.7% and 35.3% of overall production of refined lead and zinc, respectively. Production of refined lead and zinc both declined slightly owing to the decrease in domestic demand. However, the industry's lead smelting capacity was increased by 6,000 tons per year at the Naoshima plant of Mitsubishi Cominco Smelting Co. Ltd. During the year, the capacity utilization rate was 78.6% for primary lead and 68.6% for primary zinc.

Imports of lead ore and concentrate decreased 11.8% to 225,650 tons in 1982 from that of 1981. The major suppliers were Canada, 52%; Peru, 25%; the Republic of South Africa, 7%; Thailand, 5%; and Australia, 5%. The remaining 6% was imported from the United States, Bolivia, and others.

Imports of zinc ore and concentrate decreased 8.4% to 813,408 tons in 1982 from that of 1981. The principal suppliers were Australia, 44%; Canada, 27%; and Peru, 21%. The remaining 8% was imported from North Korea and others. To meet the domestic demand for lead and zinc metals, Japan also imported 45,424 tons of refined lead, mainly from Australia, and 44,265 tons of refined zinc, mainly from North Korea.

Domestic demand for primary lead decreased 6.4% to 254,295 tons in 1982 from that of 1981 because of the decrease in demand from storage batteries, inorganic chemicals, and lead pipe and sheet. However, domestic demand for primary zinc increased slightly to 690,904 tons owing to the continuous strong demand from the galvanizing sector for galvanized steel sheet, wire, and tube. Exports of refined lead rose 166% to 7,425 tons, while exports of refined zinc fell 20% to 40,767 tons. The major buyers of Japanese refined lead were Taiwan, North Korea, the Republic of Korea, and the Philippines. The principal buyers of Japanese refined zinc were the Philippines, Taiwan, China, and the Republic of Korea.

By yearend, stocks of primary lead totaled 34,335 tons, of which 16,392 tons was at producers' plants, 2,604 tons at distributors' warehouses, and 15,339 tons was held by consuming manufacturers. Stocks of primary zinc totaled 171,250 tons, of which 84,214 tons was at producers' plants, 3,649 tons at distributors' warehouses, 22,484 tons was held by the consuming manufacturers, and 60,903 tons was held by the Metallic Mineral Stockpiling Association. During 1982, a total of 25,277 tons of primary zinc was sold back to the producers.

Six major zinc smelters led by Mitsui Mining & Smelting Co. Ltd. reportedly were developing a new zinc smelting process to reduce energy consumption. A semicommercial operational plant was expected to be built at a cost of $5.2 million with Government financial assistance over a 3-year period beginning in 1983. A reducing agent, reportedly, would be added to the oxide ore in the new process; the ore is then blown into a blast furnace without the use of electric power as a heat source. It was claimed that the production of refined zinc under the new process could save up to 60% of the production cost of traditional electrolytic refining.[14]

According to the Metal Mining Agency of Japan, four promising lead-zinc deposits were discovered in 1982. The first discovery was at Hokoroku in Akita Prefecture. The black ore deposit has an average ore grade of 3.02% lead, 8.01% zinc, and 4 grams of gold and 760 grams of silver per ton of ore. The mining rights were owned by Dowa Mining Co. Ltd. The second discovery was at Kudoh in Hokkaido. There were two deposits in the Kudoh area. Based on the exploratory drilling, one deposit has an ore grade of 4.16% lead, 9.42% zinc, and 2.2 grams of gold and 149 grams of silver per ton of ore. The other deposit, at Kaminokuni, has an ore grade of 3.54% lead, 6.02% zinc, and 3.9 grams of gold and 1,079 grams of silver per ton of ore. The mining rights to these two deposits belong to Mitsui Mining & Smelting. The third discovery was at Atotsugawa of Hida area in Gifu Prefecture. The deposit has an ore grade of 12.6% zinc and 13.6 grams of silver per ton of ore. The fourth discovery was at Nishikigawa area of Yamaguchi Prefecture. The deposit has an ore grade of 3.02% zinc, 1.17% copper, 0.49% tungsten, and 0.48% tin.[15]

Table 5.—Japan: Lead and zinc, 1982 annual capacity

(Metric tons)

Company	Plant location	Capacity	Electrolytic distillation
Lead:			
Dowa Mining Co. Ltd	Kosaka	25,200	--
Hosokura Mining Co. Ltd	Hosokura	21,600	--
Mitsubishi Cominco Smelting Co. Ltd	Naoshima	[1]42,000	--
Mitsui Mining & Smelting Co. Ltd	Kamioka	33,600	--
	Takehara	43,800	--
Nippon Mining Co. Ltd	Saganoseki	36,000	--
Rasa Industries Co. Ltd.[2]	Miyako	[3]2,640	--
Sumiko ISP Co. Ltd.[4]	Harima	26,400	--
Toho Zinc Co. Ltd	Chigirishima	72,000	--
Total		303,240	--
Zinc:			
Akita Smelting Co. Ltd	Iijima	156,000	--
Hachinohe Smelting Co. Ltd	Hachinohe	--	84,000
Hosokura Mining Co. Ltd	Hosokura	21,600	--
Mitsubishi Metal Corp	Akita	105,600	--
Mitsui Mining & Smelting Co. Ltd	Kamioka	72,000	5,280
	Hikoshima	84,000	--
	Miike	--	116,400
Nippon Mining Co. Ltd	Mikkaichi	--	120,000
Nisso Metal Co. Ltd	Aizu	[3]31,200	--
Sumiko ISP Co. Ltd	Harima	--	79,200
Toho Zinc Co. Ltd	Annaka	139,200	--
	Chigirishima	--	5,160
Total		609,600	410,040

[1]Annual capacity of dry smelting was expanded by 6,000 tons in September 1982.
[2]The smelter was sold to Godo Shigen Sangyo Co. in October 1981.
[3]Idle capacity.
[4]A wholly owned subsidiary of Sumitomo Metal Mining Co. Ltd.

Nickel.—Japan remained the world's third largest producer and consumer of nickel metal and continued to import all of its nickel requirements from overseas sources. During 1982, 2,996,755 tons of nickel ore containing 51,400 tons of nickel was imported from New Caledonia, Indonesia, and the Philippines; 40,374 tons of nickel matte containing 30,370 tons of nickel was imported from Australia, Indonesia, New Caledonia, and Guatemala, and 12,930 tons of nickel-cobalt mixed sulfide containing 3,740 tons of nickel and 2,060 tons of cobalt was imported from Australia and the Philippines.

Production of refined nickel by Nippon Mining and Sumitomo Metal Mining decreased slightly. The nickel refining sector was operating at 86.8% of its 26,880-ton-per-year capacity. To meet the domestic demand for nickel, Japan imported 19,689 tons of nickel metal mainly from Canada, 22.2%; the U.S.S.R., 21.5%; the Philippines, 15.4%; Australia, 14.8%; and the United States, 12.5%.

Domestic demand for refined nickel decreased 3.9% to 32,768 tons in 1982. Consumption of nickel by the specialty steel industry, which accounted for 46.6% of domestic demand, increased 17.2%, while consumption of nickel by all other industries decreased. The other major nickel consumers were the manufacture of galvanized sheet, 18.6%; nickel-copper and other nonferrous alloys, 14%; magnetic materials, 7%; rolled sheets, 3.8%; and other, 10%. In 1982, Japan exported only 298 tons of refined nickel, mainly to Taiwan and Indonesia.

In November, a major contract was signed between Sumitomo Metal Mining, Japan's largest producer of refined nickel and ferronickel, and the Western Mining Corp. (WMC) of Australia. The contract calls for WMC to supply a minimum of 15,000 tons of nickel matte per year to Sumitomo Metal Mining over a 10-year period. The nickel matte will be shipped from the Kalgoorlie smelter of Western Australia to Niihama refinery of Sumitomo Metal Mining.

As a result of a 12% increase in imports of ferronickel, which amounted to 29,758 tons in 1982, domestic production of ferronickel dropped 12% to 214,523 tons. In December, Shimura Kako Co. reportedly shut down its 10,200-ton-per-year ferronickel smelter at Date in Hokkaido and dismissed all 135 workers. Tokyo Nickel Co. Ltd., which operated a nickel oxide sinter plant with an annual capacity of 13,200 tons at Matsuzaka, reportedly was to take over

the market share of Shimura Kako starting in 1983.

Tin.—Mine production of tin continued to decline and remained insignificant in 1982. The total mine output was equivalent to about 2% of Japan's tin requirements, while production of primary tin, which used domestic ore and other materials, was about 4.5% of the domestic demand. Over 95% of Japan's tin requirements was dependent on imports. During the year, Japan imported 26,185 tons of tin metal, mainly from Malaysia, 14,895 tons; Indonesia, 6,643 tons; Thailand, 4,254 tons; and others, 393 tons.

Japan was the world's third largest consumer of tin metal. Domestic demand for tin metal decreased 5% to 29,000 tons. Demand for tin by the manufacturer of tinplate remained weak, while demand by the soldering industry fell sharply as a result of reduced production in sound equipment and automobiles.

Titanium.—Production of titanium sponge metal fell sharply after a record high of 24,818 tons was reached by the industry in 1981. A significant decline in demand from the depressed aircraft industry of the United States and Europe and lower domestic demand by the manufacturer of heat exchange tubes and desalination equipment were cited by the industry source as the major causes of the decline. Titanium sponge prices (f.o.b. shipping point) for domestic market range from $5.55 to $7.65 per pound, while export prices dropped sharply to an estimated range of $5 to $6 per pound with a discount in 1982 from the range of $8.85 to $10.03 per pound in 1981.

Osaka Titanium Co. Ltd., the single largest titanium sponge supplier of the Western World, reportedly, was operating at 50% of its 18,000-ton-per-year capacity with only one-third of the old facilities operating and a full capacity operation of the new plant, which was completed at Amagasaki early in 1982. Toho Titanium Co. Ltd. and Nippon Soda Co. Ltd. were also operating at about 50% of their installed capacities with a 1-month suspension of Toho Titanium's sponge production in December.

Imports of rutile and ilmenite for titanium dioxide and sponge metal production remained high at 367,500 tons. The major suppliers were Malaysia, 38%; Australia, 22%; India, 21%; and Sri Lanka, 6%.

According to industry sources, domestic shipments, including internal plant consumption for the production of ingot, dropped to 10,617 tons in 1982 from 14,393 tons in 1981. Exports of titanium sponge metal fell drastically to 3,500 tons from 10,005 tons in 1981. Exports to France rose 131.7% to 1,170 tons. However, exports to the United States fell 81.1% to 812 tons, exports to the United Kingdom dropped by 60.6% to 1,075 tons, and exports to the Netherlands plunged 90.5% to only 210 tons. As a result of a 26% decline in domestic demand and a 65% drop in exports, stocks held by producers rose 152% to 4,560 tons at yearend 1982. Stocks held by Toho Titanium, reportedly, were over 2,000 tons by yearend.

Despite the severely depressed world titanium market and Japan's excess titanium production capacity, a 50:50 joint venture company called Showa Titanium Co. Ltd. was formed by Showa Denko and Ishizuka Research Institute Ltd. to produce titanium sponge using the latest technology from Ishizuka. According to Showa Denko officials, the $20 million plant was expected to be built at Fujiyama in Toyama Prefecture beginning in January 1983 and was scheduled for completion in August 1983 with an annual capacity of 3,000 tons. To reduce the production costs, the electricity for production of titanium sponge at the new plant will be supplied by it own hydroelectric generation system.[16]

Other Metals.—Japan's other metal mine production included chromium, manganese, molybdenum, and tungsten. However, domestic mine output of these metals were of low grade and small quantity relative to the import materials for consumption by Japan's iron and steel industry.

Mine production of chromium ore and concentrate was 11,000 tons compared to 642,000 tons consumed by the Japanese iron and steel industry. Japan imported 694,521 tons of chromium ore and concentrate (all grades) mainly from the Republic of South Africa, India, the U.S.S.R., and the Philippines. To meet the requirements for stainless steel production, an additional 214,313 tons of ferrochromium was imported, primarily from the Republic of South Africa, Brazil, Zimbabwe, China, and India. Chromium metal production by Toyo Soda Industries Co. Ltd. and Nippon Denko Co. Ltd. was 88% of installed capacity in 1982. The metal was used mainly for the manufacture of superalloy steel, 67%; nonferrous alloys, 24%; and welding rod, 8%.

Mine production of manganese ore and concentrate was 81,500 tons compared to 1.2 million tons consumed by the iron and steel industry. Imports of manganese ore and

concentrate containing more than 39% manganese was 1.1 million tons, and ore and concentrate containing 39% or less was 400,000 tons. The Republic of South Africa, Australia, Brazil, Gabon, and Mexico remained the major suppliers. Major contract agreements were reached between Japanese ferromanganese producers and manganese ore suppliers from the Republic of South Africa, Australia, and Gabon in early 1982. The 1982 prices of high-grade ore ranged from $78.50 to $80.00 per ton or about 8% lower than that of 1981. The output of ferromanganese decreased in 1982 as a result of the cutback in Japanese steel production, while production of manganese dioxide continued to increase owing to the increased demand from the manufacturers of electric cells. Mitsui Mining & Smelting, Japan's largest manganese dioxide producer, expanded its annual capacity by 6,000 tons to 25,200 tons at the Takehara plant. In 1982, Japan's manganese dioxide production capacity was 58,200 tons. Production of manganese metal continued to decline, and the industry was operating at 40% of the installed capacity because of further weakening of demand from the manufacturers of nonferrous alloys.

Molybdenum mine production was estimated at 190 tons of ore and concentrate containing 85% MoS_2. Consumption of molybdenum ore by the iron and steel industry totaled 8,728 tons. To meet the requirements of the steel industry and molybdenum metal production, 17,245 tons of molybdenum concentrate was imported from the United States, 38%; Canada, 35%; Chile, 20%; and other, 7%. Production of ferromolybdenum increased slightly. Japan imported 374 tons of ferromolybdenum, of which Austria supplied 240 tons. Consumption of ferromolybdenum for the manufacture of structural alloy, stainless, heat-resistant, and tool steels by the specialty steel industry remained at the same level as that of 1981. Molybdenum metal production for fabrication of fine wire rods and sheet, which were widely used in bulbs and electronics, increased slightly.

Mine production of tungsten ore and concentrate decreased to 1,829 tons containing 43.8% WO_3, while imports of tungsten ore and concentrate totaled 2,297 tons. China and the Republic of Korea remained the dominant overseas suppliers. Because of the reduced demand for ultrahard alloys and tool steel, the output of ferrotungsten declined. Production of tungsten metal, mostly in powder form, also declined owing to the weakened demand from the automobile and heavy electrical sectors.

Both primary and secondary magnesium production declined, primarily owing to a substantial cutback in light-metal rolling and aluminum alloys as well as reduced production of titanium, which uses most of secondary magnesium as a reducing agent.

Other important metal production by the Japanese mineral processing sector includes antimony, bismuth, cadmium, cobalt, indium, palladium, platinum, rare earths, selenium, tantalum, tellurium, and zirconium. These metals were produced mostly from imported materials or produced as a byproduct of domestic ore. Since 1980, production of these metals became vital to the Japanese machinery and electronic industries, as well as to manufacturers of high-value-added products for export and domestic consumption. Because of the slower growth in the Japanese economy and reduced exports of automobiles and industrial machinery and equipment, production of these metals declined slightly in 1982.

NONMETALS

Cement.—Japan remained one of the world's leading cement producers with a high level of technology in energy efficiency, pollution control, and productivity. The industry has an annual capacity of 115 million tons with 24 companies, which operated 59 plants throughout the country. The raw materials, which include limestone, clays, silica sand, and gypsum, are abundant in supply from the domestic nonmetallic mining industry. However, the industry's energy source, coal, was 80% dependent on imports.

Because of the reduction in private construction and in public work projects, cement production and domestic sales decreased. The industry was operating at an average of 69% of capacity, and many companies, reportedly, were involved in laying off workers. However, exports of portland cement and other hydraulic cements rose 13.4% to 11.4 million tons owing to increased demand from the Middle East and Southeast Asia. In 1982, 10.8 million tons of portland cement was exported, mainly to Saudi Arabia, 27%; Kuwait, 24%; Singapore, 16%; Hong Kong, 12%; and Iraq, 6%. Exports of other hydraulic cement totaled 566,584 tons, of which 68.5% was shipped to Kuwait, and 16%, to Saudi Arabia.

According to industry sources, practically all cement plants operated by the 24 companies had converted their energy source from

C-type fuel oil to coal in 1982. After the 1973 oil crisis, the industry began a systematic conversion of its energy source. The ratio of conversion was 2% in 1973; it reached 90% in mid-1981 and 100% in 1982.

To increase energy efficiency and productivity, a precalciner called new suspension preheater (NSP) kiln was introduced to the industry in 1971. The NSP system is not only more energy efficient because of lower energy requirements, but also is less polluting (less nitrogen oxide) because of the low combustion temperature inside the precalciner. In addition, the NSP kiln can easily adapt its energy source from oil to coal. In mid-1980, over 98.2% of the industry capacity used the dry process, of which 66.8% was the NSP dry process. As of 1980, there are 63 NSP kilns in Japan. One plant has more than 9,000-ton-per-day capacity; four plants have 7,000- to 9,000-ton-per-day capacity each; seven plants have 5,000 to 7,000 tons per day each; and the remaining plants were less than 5,000 tons per day each. The average production capacity per NSP plant was 3,790 tons per day.[17]

In 1981, several NSP kilns were installed by the industry. In 1982, two NSP kilns were installed. Nippon Cement Co. Ltd. replaced its No. 4 conventional kiln with an NSP kiln at Saiki plant, while Osaka Cement Co. Ltd. replaced its No. 6 kiln at Kochi plant with an NSP kiln. Of the 80.4 million tons of cement produced in 1982, 74% was by the NSP kiln. The world's largest Loesche roller mill was installed by Osaka Cement at Kochi. The clinker mill, with a daily capacity of 7,200 tons, came onstream as planned.

During 1982, several plants suspended operations because of reduced demand. Niho Cement Co. Ltd. closed two kilns in Hiroshima and in Saitama Prefectures. Onoda Cement Co. Ltd. suspended one kiln in Yumaguchi Prefecture and two kilns in Oita Prefecture. Sumitomo Cement Co. Ltd. reportedly was expected to close up to five kilns in Hyogo and Gifu Prefectures.

Japan's cement producers reportedly were planning to form a cartel to cope with the sluggish cement market. The Cement Association of Japan was to apply for permission from Japan's Fair Trade Commission to form the cartel for 3 to 6 months.

Fertilizer Materials.—Japan remained a significant producer of nitrogen fertilizer in the world. The output of ammonia totaled 2 million tons, and urea, 1.3 million tons. However, the ammonia production represented only 59% of an annual capacity of 3.37 million tons, and urea production, 56% of an annual capacity of 2.32 million tons. By 1981, the production capacity of ammonia and urea had been cut by 26% and 42%, respectively, according to the recommendation of the Industrial Structure Council because of the increased prices of feedstock and reduced demand for nitrogen fertilizer. In June 1982, the Industrial Structure Council recommended a further cut of ammonia and urea capacities by 660,000 tons and 830,000 tons, respectively. The Japan Urea and Ammonium Sulfate Industry Association (JUASIA) reportedly has approved a plan to scale down ammonia annual capacity by 510,000 tons and urea annual capacity by 800,000 tons starting in 1983.

According to the JUASIA, the industry produced 1.7 million tons of ammonium sulfate in 1982, of which 52% was for fertilizer use, 12% for high-analysis compound fertilizer use, 2% for industrial use, and 34% for exports. Production of urea was 1.3 million tons, of which 20% was for fertilizer use, 5% for high-analysis compound fertilizer use, 43% for industrial use, and 32% for exports.

Production of phosphatic and compound fertilizers in Japan was estimated at 3.1 million tons, a slight increase over that of 1981. Most of the high-analysis compound fertilizer and superphosphate was consumed domestically. Domestic demand for compound fertilizers was reduced substantially because of the increased competition from granular mixed fertilizers and the Government policy of reducing the rice-planting area.

Raw material requirements of Japan's phosphatic and compound fertilizer industry were met mostly by imports. Imports of phosphate rock totaled 2.2 million tons. The major suppliers were the United States, 56%; Morocco, 27%; and Jordan, 11%. Imports of potash totaled 1.1 million tons. Canada and the U.S.S.R. remained the two dominant suppliers, accounting for 55.5% and 15%, respectively, of total imports. The United States, the Federal Republic of Germany, and Israel were the other important suppliers of potash to Japan.

In late 1982, three chemical fertilizer manufacturers associations, JUASIA, Japan Phosphatic and Compound Fertilizer Association, and Japan Ammonium Chloride Fertilizer Association, were planning to form a chemical fertilizer export association in mid-1983 to reduce competition in the export markets in China, India, and Southeast Asian countries. The export association

was expected to assist the industry in long-term forecasting, in selecting export markets, and in working out a measurement for a more stable export.

Iodine.—Japan remained the world's largest producer of iodine. Production represented about 73% of the industry's annual capacity of 9,756 tons. Most of the iodine was produced from Chiba, Niigata, and Miyazaki Prefectures. Because of a steady growth in demand for iodine in food and feed additives, X-ray contrast media, industrial chemicals, catalysts, photosensitive materials, and pharmaceuticals, Japan's iodine production increased steadily.

Ise Chemical Industry Co., the largest iodine producer in Japan, reportedly was undertaking a major expansion program that includes development of iodine derivatives, development of new compounds, and a complete technical service to users. The company has expanded its Miyazaki plant capacity from 240 to 700 tons per year in Southern Kyushu and began surveys on production sites in Canada, the United States, and Central and South America. Because of the ground sinking problem in the Chiba Prefecture, where most of the company's iodine production was based, Ise Chemical in 1980 began its search for overseas production sites to expand its capacity, especially in the United States.

Other Nonmetals.—Japan's other important nonmetal production included aplite, feldspar, bentonite, fire clay, gypsum, kaolin, magnesia clinker, pyrites, pyrophyllite, salt, and sulfur. Because of the slowdown in the Japanese economy, most nonmetal production declined in 1982.

Japan remained the world's leading producer of limestone. Most of its output was consumed domestically by the cement and iron and steel industries. Dolomite production was used mainly by the iron and steel industry and for road construction. Magnesia clinker was used for steelmaking and for refractories. Production of synthetic gypsum as a byproduct of phosphoric acid processing was mainly for cement and gypsum wallboard manufacturing. Over the past 2 years, bentonite clays production was increased from 400,000 to 480,000 tons as a result of the increased consumption in foundries, oil well drilling, and pesticides. Fire clays and kaolin were consumed mainly by the paper, ceramics, refractories, and foundry industries. Production of aplite and feldspar was for the ceramics and glass industries. Sulfur and pyrites were for use in the chemical industry, and pyrophyllite was for ceramics, refractories, and pesticides.

Japan remained a major salt consumer in the world. Japan imported about 86% of its salt requirements in 1982. Mexico and Australia were the major overseas suppliers, each accounting for 46% of Japan's total salt imports. Japan's domestic production of salt was estimated at 1.1 million tons. Imports of salt decreased slightly to 6.3 million tons. The total demand was about 8 million tons, of which 1.6 million tons was for general use, and 6.4 million tons was consumed by the soda industry. Production of caustic soda declined from 3 million tons in 1981 to 2.8 million tons in 1982. Most caustic soda was consumed domestically by the chemical industry. The growing users of caustic soda in Japan included paper and pulp, and inorganic and organic petrochemicals, while the other major users in the manufacture of chemical fiber and alumina remained sluggish.

MINERAL FUELS

Japan's primary energy supply, as estimated by the Natural Resources and Energy Agency of MITI, dropped 2.8% to 3,838.6 trillion kilocalories or 7,037,000 barrels per day of oil equivalent in fiscal year 1981 (ending March 31, 1982).

Over the past 2 years, Japan's dependency on imported energy dropped from 85.3% in fiscal year 1980 to 84.8% in fiscal year 1981. The relative importance of oil (99.8% was imported) in Japan's primary energy supply also dropped to 63.7% in fiscal year 1981 from 65.8% in the previous year.[18]

Table 6.—Japan: Primary energy supply

(Thousand 42-gallon barrels per day)

Energy source	Fiscal year 1980	Fiscal year 1981
Petroleum:		
Domestic crude	8	8
Imported crude	4,222	3,893
Imported products	312	347
Imported liquefied petroleum gas	221	232
Coal:		
Domestic	224	215
Imported	1,007	1,079
Hydropower	413	407
Nuclear power	371	394
Imported liquefied natural gas	416	416
Domestic natural gas	43	42
Other[1]	4	4
Total	7,241	7,037

[1]Includes domestic lignite, charcoal, and firewood.

For fiscal year 1981, Japan's energy consumption was estimated at 6,887,000 barrels per day of oil equivalent, of which 13.8% was consumed by the iron and steel sector; 26.8% by other mining and manufacturing sectors; 7.7% by the energy sector; 14.8% by the transportation sector; 2.4% by the agriculture, forestry, and fishery sector; 23.8% by the household and commercial sector; 7.6% by the nonenergy sector; and 3.1% was exported. By the form of energy consumed, oil and liquefied petroleum gas accounted for 52.1%; electricity, 32.5%; coke, 6.8%; city gas, 2.7%; coal, 2.4%; coke oven gas, 1.5%; blast furnace gas, 1.5%; natural gas, 0.3%; and others, 0.2%.

Coal.—Domestic mine production of coal in 1982 declined slightly from that of 1981 owing to the continued shutdown of the Yubari Mine in Hokkaido. The output was equivalent to 18.2% of Japan's coal demand for the year. To meet its coal requirements, Japan imported 78.5 million tons of coal in 1982, of which 64.1 million tons was coking coal, 13.8 million tons was steam coal, and 630,000 tons was anthracite.

Japan's coal mining industry consists of 33 companies and 45 coal mines. In 1982, only 28 of the 45 mines were operating, 20 in Hokkaido, 5 in Kyushu, and 3 in Honshu (the main island). Of the total coal produced, 69.7% was steam coal; 30.1%, coking coal; and 0.2%, anthracite. The average heating value was 6,370 kilocalories per kilogram in 1982 compared with 6,450 kilocalories per kilogram in 1981. The number of mine workers at the end of 1982 dropped 8.9% to 16,343 from that of 1981, but labor productivity rose to 90.5 tons per month of coal per miner in 1982 from 79.4 tons per month of coal per miner in 1981. However, the working days of Japanese coal miners increased to 299.6 days in 1982 from 296.4 days in 1981.

Because of the cutbacks in production of iron and steel, imports of coking coal dropped slightly in 1982. The major suppliers of coking coal were Australia, 39%; the United States, 37%; Canada, 15%; the Republic of South Africa, 5%; and others, 4%. Imports of steam coal continued to increase owing to the growing demand from the utility industry. The major suppliers of steam coal were Australia, 46%; the United States, 12%; China, 11%; and others, 31%. Imports of anthracite mainly for the manufacture of briquet decreased sharply. China and Vietnam remained the two dominant overseas suppliers.

The 1982 average price of imported steam coal was 2% to 4% lower than that of 1981, but the import price of coking coal was 4% to 9% higher than that of 1981. The average c.i.f. prices per ton of steam coal in 1982 range from $64.93 (Australia) to $70.60 (United States), while the average c.i.f. price of coking coal ranged from $68.11 (Australia) to $82.91 (United States).

Demand for coal decreased slightly in 1982 owing to the reduced demand from the manufacturing sector.

Table 7.—Japan: Coal consumption by sector

(Thousand metric tons)

Consuming sector	1981	1982
Manufacturing:		
Coke	5,197	4,330
Domestic	1,291	941
Imported	3,906	3,389
Iron and steel	64,256	62,679
Domestic	3,723	2,979
Imported	60,533	59,700
Cement, ceramics, and other	12,590	12,910
Domestic	3,373	2,718
Imported	9,217	10,192
Utilities:		
Electric power:		
Domestic	9,221	9,518
Imported	3,309	4,481
Total	12,530	13,999
Gas:		
Domestic	669	548
Imported	773	877
Total	1,442	1,425
Other:		
Domestic	1,418	1,526
Imported	47	10
Total	1,465	1,536
Grand total	97,480	96,879
Domestic	19,695	18,230
Imported	77,785	78,649

To diversify the Japanese major overseas coal sources away from Australia into the United States, the New Energy Development Organization (NEDO) of Japan, a quasi-governmental agency, awarded a contract to Bechtel Corp. of the United States for conducting a comprehensive survey on steam coal resource development in the United States in mid-1982. According to the contract, Bechtel was to select 11 major coal regions in the States of Alabama, Alaska, Colorado, Illinois, Montana, Utah, and Wyoming, and to analyze the possibility of establishing a coal chain system to handle steam coal from the mine mouth in 11 coal regions to the ocean ports in the United

States. The survey was expected to be completed by March 1983. According to a NEDO official, the survey was expected to serve as a guide for Japan to a joint venture development of steam coal in the United States and importation of steam coal from the United States in the future.[19]

In late 1982, two Japanese concerns reportedly withdrew from two steam coal projects in Australia. The Birds Rock Steam Coal project of New South Wales was a joint venture of the Japan Coal Development Co., Taiheiyo Coal Development Co., Mitsui & Co., and C. Itoh & Co. Ltd. of Japan and the New South Wales State Electricity Commission (SEC) of Australia. The 3-million-ton-per-year coal project was expected to be terminated. The Mount Arthur South steam coal project, also in New South Wales, was a joint venture between the Electric Power Development Co. and Mitsui of Japan and SEC. The 4-million-ton-per-year coal project reportedly was to be postponed indefinitely. The reduced demand for steam coal by the Japanese electric power industry based on a lower projection of electricity requirements in Japan's long-term energy supply and demand forecast was cited as the major reason for the Japanese to drop the steam coal development projects in New South Wales, Australia. However, the coking coal project at the Riverside Mine in central Queensland, Australia, reportedly was expected to start operation in October 1983. Under an agreement signed between Japanese steel mills and the Queensland State government in December 1980, Japan was expected to import a total of 47.5 million tons of coking coal from the Riverside Mine over a 14-1/2-year period beginning in October 1983.

In October, a trade agreement was signed between 13 Japanese companies and McIntyre Mines Ltd. of Canada. The agreement calls for McIntyre Mines to export 1.8 million tons of coking coal to Japan over 1983-84 from its Smokey River coal operation in Grande Cache in Canada.

In September 1982, a revised bilateral trade agreement was signed between Japan and China. The revised agreement calls for a reduction of annual coal imports from China to 4.5 million tons (2 million tons of coking coal and 2.5 million tons of steam coal) in 1983, 6 million tons in 1984, and 7 to 8 million tons in 1985. Under the old agreement, annual coal imports from China were 10 million tons.

Petroleum and Natural Gas.—Domestic production of crude oil increased slightly; however, it remained insignificant in Japan's total crude oil supply. Because of the slowdown in the Japanese economy, the continuing shifting of the country's energy sources away from oil, and the successful energy conservation programs in major oil-consuming industries, Japan's imports of crude oil continued to decrease by 6.8% to 1,350 million barrels in 1982 from that of 1981. Consumption of crude oil (refinery input of crude oil) also declined 7.2% to 1,231 million barrels. The Japanese petroleum refining industry was operating at 56.8% of the installed capacity compared with 61.2% in 1981.

Despite the weakened yen against the U.S. dollar, the total value of crude oil imports decreased to $46.3 billion in 1982 from $53.3 billion in 1981 owing to the reduced import volume and the lower oil price. The average price of imported crude was $34.69 per barrel in 1982 compared with $37.31 per barrel in 1981. Japan also took advantage of the soft international spot crude market in 1982. Imports of crude purchased from the spot market rose to 9% of total imports in 1982 from 5.6% in 1981. The low-priced spot oil reportedly was offered mainly by Iran.

The pattern of Japan's imported crude oil supply remained about the same as 1981. Crude oil supplied by major international oil companies was 43.1% in 1982 compared with 44.7% in 1981. Crude oil supplied by oil-producing countries through direct deals and government-to-government basis was 44.9% in 1982 compared with 44.8% in 1981. Crude oil supplied by other independent international companies was 3.5% in 1982 compared with 3.7% in 1981. However, the share of imports supplied by Japanese producers of overseas oil increased to 8.5% in 1982 from 6.8% in 1981.[20]

In 1982, Japan's import reliance of crude oil remained at 99.8%. The major sources of imported crude oil were the Middle East accounting for 70.6% and Southeast Asia, 19.6%. The principal supplying countries were Saudi Arabia, 35.4%; Indonesia, 15.2%; the United Arab Emirates, 13.4%; Iran, 6.2%; and China, 4.8%. The share of crude oil imports from Africa declined to 1.3% in 1982 from 4.4% in 1981 because of a substantial reduction in imports from Libya. The share of imports from Latin America also declined slightly to 3.7% but with more imports coming from Mexico in 1981 than in 1982.

After Japan and China signed a contract for joint exploration and development of oil

resources in China's Bo Hai Bay in May 1980, the exploratory drilling began in December 1980. Japan China Oil Development Corp., a Tokyo-based company, was assigned as operator for exploration with 100% financing by Japan, and as operator for development with 51% financing by China and 49% by Japan. China will be responsible for oil production with 100% financing by China. The sharing of oil production between Japan and China will be based on 42.5:57.5 ratio in favor of China. By the end of 1982, the total cost of exploration was raised to $600 million from the original estimate of $210 million. According to industry sources, a total of eight oilfields were discovered by the end of 1982.

Because of reduced demand for petroleum products, Japan's refining industry was expected to reduce its total capacity by 11.8% to 5.24 million barrels per day in 1983. The capacity reduction program was in line with the reorganization and restructuring of the oil industry to help streamline the industry's production and market shares, and to stabilize the domestic oil market under low-growth market conditions.

Domestic production of natural gas declined slightly in 1982 and accounted for approximately 0.6% of Japan's primary energy supply and 7.4% of total natural gas and liquefied natural gas (LNG) supply. Natural gas produced from natural gasfields remained at 97.9%; the remainder was produced from oilfields and coalfields. The major producing areas were Niigata Prefecture, accounting for 78% of total output; Chiba Prefecture, 19.8%; and Akita Prefecture and other, 2.2%.

In 1982, Teikoku Oil Co. Ltd., Esso Petroleum Development Co., and East Japan Oil Development Co. reportedly were jointly constructing offshore gas production facilities of the Iwaki Gasfield about 25 miles off the coast of Fukushima Prefecture. The $400 million development project was scheduled for completion in early 1984. The output of natural gas was expected to be at a daily rate of 42.2 million cubic feet in 1984.

Distribution of domestically produced natural gas totaled 70,439 million cubic feet, mainly to the oil and gas mining industry for pressure maintenance, chemical industry for feedstock, utility industry for power generation, and city gas industry for household service. About 93% of Japan's natural gas requirements was met by imports in the form of LNG.

Imports of LNG rose 3.8% to 17.48 million tons in 1982, of which 52% was imported from Indonesia, 29.5% was from Brunei, 13% was from Abu Dhabi, and 5.5% was from Alaska of the United States. Because of the soft international oil market, the average import price of LNG, in dollars per million British thermal units (Btu), declined to $5.74 in 1982 from $5.83 in 1981. Indonesia's price was the lowest at $5.63 per million Btu compared to the highest from Abu Dhabi at $6.27 per million Btu in 1982.

Consumption of imported LNG was for electric power generation, 76%; city gas, 21%; and industrial use, 3%.

In April, an agreement was reached between Japan and the United States for the extension of Alaskan LNG exports to Japan to 1989. The old contract, which allowed exports of LNG from Alaska to Japan, began in 1969 and was expected to expire in May 1984. Japan imported about 1 million tons of LNG from the United States annually.

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[1]Economist, Division of Foreign Data.
[2]Where necessary, values have been converted from Japanese yen (Y) to U.S. dollars at the rate of Y220.54=US$1.00 for 1981 and Y249.05=US$1.00 for 1982.
[3]The Asian Wall Street Journal. V. 7, No. 138, Mar. 18, 1983, p. 3.
[4]Japan Metal Journal (Tokyo). V. 12, No. 46, Nov. 15, 1982, p. 8. American Metal Market. V. 90, No. 247, Dec. 22, 1982, p. 6.
[5]U.S. Embassy, Tokyo, Japan. State Department Telegram 19726, Nov. 10, 1982.
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[13]The Asia Record (Hong Kong). V. 3, No. 10, January 1983, p. 3.
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[14]Japan Metal Journal (Tokyo). V. 12, No. 30, June 26, 1982, p. 2.
[15]Japan Metal Review (Tokyo). No. 492, Sept. 9, 1982, p. 2; No. 497, Oct. 21, 1982, p. 1; and No. 506, Dec. 23, 1982, p. 1.
[16]Japan Chemical Week (Tokyo). V. 23, No. 1170, Sept. 16, 1982, p. 7.
[17]Rock Products. V. 85, No. 5, May 1982, pp. 64E-64F.
[18]Japan Petroleum and Energy Weekly (Tokyo). V. 17, No. 49, Dec. 6, 1982, p. 3.
[19]U.S. Embassy, Tokyo, Japan. State Department Telegram 14916, Aug. 31, 1982.
[20]Japan Petroleum and Energy Weekly (Tokyo). V. 18, No. 5, Jan. 31, 1983, p. 10.

The Mineral Industry of Jordan

By Peter J. Clarke[1]

Jordan's mineral industry, and its economy in general, continued to expand in 1982, albeit at a somewhat slower rate than in previous years. Jordan's gross domestic product, after having increased 7.6% in real terms from 1980 to 1981, grew about 5% in real terms in 1982 to an estimated $3.9 billion, despite a 7% depreciation of the dinar with respect to the U.S. dollar.[2]

Jordan's mineral industry continued to be one of the fastest growing sectors of the economy. In 1982, commercial production began from the Jordan Fertilizer Industries Co. (JFI) plant at Aqaba and from the Arab Potash Co. (APC) operation on the Dead Sea. The phosphate mining industry was able to increase output in 1982, marking the eighth straight year of production increases. Jordan's other mineral-related industries were cement and construction material production and petroleum refining. Despite continued efforts in 1982, no commercial reserves of oil have been found in the country, and Jordan continued to rely on petroleum imports for its energy requirements.

PRODUCTION

Production of Jordan's major minerals increased slightly in 1982, led by a 3.5% increase in phosphate rock production, and the first commercial production of potash and phosphatic fertilizer. Production of gypsum and cement declined slightly during the year. The production of refined petroleum products increased substantially in 1982, owing to the completion of the expansion project at the country's only refinery, at Zarqa. The expansion made Jordan nearly self-sufficient in refined products, a remarkable achievement for a non-oil-producing country with one of the highest energy consumption growth rates in the world, over 10% per year. Completion of the potash plant, the fertilizer facility, the refinery expansion, and the recent addition of a new cement production line at the Fuheis cement plant represent major advancements in Jordan's goal to develop and use to its advantage all its available domestic resources.

Table 1.—Jordan: Production of mineral commodities[1]

Commodity	1978	1979	1980	1981[p]	1982[e]
Cement, hydraulic metric tons	564,000	[r]767,000	[r]913,000	892,000	[2]795,000
Clays do.	9,000	25,000	30,000	20,000	[2]14,335
Gypsum do.	36,000	36,000	70,000	53,054	[2]39,959
Iron and steel: Crude steel do.	60,000	90,000	90,000	90,000	100,000
Lime do.	3,000	3,500	[e]3,500	4,000	[2]59,839
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	2,108	2,465	2,263	2,550	2,925
Jet fuel do.	1,152	1,104	1,759	1,800	2,000
Kerosine do.	1,146	1,062	1,314	1,327	1,600
Distillate fuel oil do.	3,109	3,499	3,509	3,550	3,800
Residual fuel oil do.	1,937	2,584	3,312	3,350	3,600
Liquefied petroleum gas do.	500	[e]565	475	500	650
Asphalt do.	643	[e]730	581	600	700
Unspecified including lubricants do.	49	[e]55	[e]50	60	65
Refinery fuel and losses do.	559	[e]635	[e]637	700	750
Total do.	11,203	12,699	[e]13,900	14,437	16,090
Phosphate:					
Mine output thousand metric tons	2,303	2,825	3,911	4,244	[2]4,390
P_2O_5 content[e] do.	748	918	1,271	1,379	1,427
Phosphatic fertilizer metric tons	--	--	--	NA	[2]117,000
Potash:					
Crude salts do.	--	--	--	--	[2]10,000
K_2O equivalent do.	--	--	--	--	[2]8,000
Salt thousand metric tons	30	30	30	30	50
Stone:					
Limestone metric tons	6,000	[e]6,000	4,182	7,000	[2]7,000
Marble do.	4,000	5,000	5,000	5,000	[2]5,100

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 1, 1983.
[2]Reported figure.

TRADE

Jordan's trade deficit continued to be a problem, growing from $2.4 billion in 1981, to an estimated $2.7 billion in 1982. In 1982, Jordan's trade deficit could not be overcome by remittances from Jordanians working abroad and foreign aid, both of which appeared to decline somewhat from that of 1981, and it ended the year with a moderate balance-of-payments deficit.

The United States maintained its position as Jordan's leading trading partner in 1982, providing the largest percentage of Jordanian imports. Mineral exports were valued at approximately $200 million in 1982, representing 25% of total exports. Saudi Arabia was Jordan's second leading trading partner, mainly by virtue of its being the sole supplier of Jordan's crude oil imports, which are delivered via the Trans-Arabian Pipeline Co. (TAPline). Imports of crude oil were valued at approximately $500 million in 1982.

Table 2.—Jordan: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	30	--		
Aluminum: Metal including alloys, all forms	800	916	--	Kuwait 360; Lebanon 202; Pakistan 200.
Chromium: Oxides and hydroxides	23	--		
Copper: Metal including alloys, all forms	605	585	--	India 424; Lebanon 69; Belgium 56.
Iron and steel: Metal:				
Scrap	820	--		
Semimanufactures	7,437	7,026	--	Iraq 5,625; Saudi Arabia 1,175; Syria 116.

Table 2.—Jordan: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead: Metal including alloys, all forms	171	110	--	All to Saudi Arabia.
Metalloids: Unspecified	--	37	--	All to Syria.
Tin: Metal including alloys, semimanufactures, kilograms	100	--		
Zinc:				
Oxides	115	--		
Metal including alloys, all forms	165	545	--	Syria 371; Lebanon 169.
Other: Ashes and residues	150	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	146	--	Oman 70; United Arab Emirates 50; Saudi Arabia 22.
Grinding and polishing wheels and stones	40	17	--	Saudi Arabia 16.
Cement	91	854	--	Iraq 628; Kuwait 213.
Chalk	2,552	--		
Clays and clay products:				
Crude, unspecified	17,909	10,439	--	Lebanon 9,501; Kuwait 838; Iraq 100.
Products:				
Nonrefractory	5,354	1,352	--	Saudi Arabia 1,301; Iraq 51.
Refractory including nonclay brick	3,509	2,164	--	Saudi Arabia 1,619; Iraq 410.
Fertilizer materials:				
Crude, unspecified	210	--		
Manufactured:				
Ammonia	6	--		
Phosphatic	57	--		
Unspecified and mixed	--	67	--	Abu Dhabi 40; Saudi Arabia 27.
Halogens: Chlorine	71	208	--	Iraq 126; Syria 42; Lebanon 36.
Lime	--	6,551	--	Iraq 6,544; Saudi Arabia 7.
Phosphates, crude thousand tons	3,623	3,529	--	Romania 684; India 630; Turkey 407; Japan 238.
Pigments, mineral: Natural, crude	341	--		
Pyrite, unroasted	85	--		
Salt and brine	17,981	7,072	--	Iraq 6,959; Qatar 113.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	106	--		
Sodium hydroxide	103	335	--	Syria 309; Lebanon 26.
Stone, sand and gravel:			-	
Dimension stone:				
Crude and partly worked	122,903	139,589	--	Syria 59,143; Iraq 51,003; Lebanon 23,338.
Worked	62,887	56,309	--	Kuwait 47,249; Saudi Arabia 5,364; Iraq 2,013.
Gravel and crushed rock	372	3,352	--	Syria 1,640; Lebanon 1,558.
Sand other than metal-bearing	795	4,456	--	Kuwait 3,976; Saudi Arabia 330; Iraq 100.
Sulfur: Sulfuric acid	264	364	--	Mainly to Saudi Arabia.
Talc, steatite, soapstone, pyrophyllite	1,055	1,508	--	Kuwait 880; Saudi Arabia 355; Canada 223.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	81	101,711	--	Saudi Arabia 88,403; Iraq 12,551.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	98	--		
Coke and semicoke	17	--		
Petroleum refinery products:				
Liquefied petroleum gas, 42-gallon barrels	--	1,640	--	All to Iraq.
Gasoline, do	4,333	94	--	All to Lebanon.
Lubricants, do	1,188	427	--	Lebanon 350; Saudi Arabia 63.

Table 3.—Jordan: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	64	--		
Aluminum:				
Ore and concentrate	54	451	--	All from United Kingdom.
Metal including alloys:				
Scrap	(1)	77	--	Saudi Arabia 55; Japan 17.
Unwrought	90	445	--	Bahrain 384; Saudi Arabia 59.
Semimanufactures	4,611	7,280	1,527	Greece 2,489; Lebanon 770; Italy 610.
Copper: Metal including alloys:				
Scrap	--	89	--	All from Saudi Arabia.
Unwrought	--	10	--	All from Japan.
Semimanufactures	495	554	24	Italy 202; Poland 129; Japan 20.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	--	6,687	32	Saudi Arabia 6,430; Lebanon 129; United Kingdom 64.
Iron and steel: Metal:				
Scrap	4,471	5,573	--	Kuwait 2,211; Saudi Arabia 1,989; Lebanon 1,126.
Pig iron, cast iron, related materials	24,643	20,729	--	West Germany 11,999; U.S.S.R. 8,349; Belgium 225.
Steel, primary forms	60,425	124,258	--	Spain 29,961; West Germany 27,206; Romania 18,614.
Semimanufactures:				
Bars, rods, angles, shapes, sections	114,075	143,606	179	Romania 25,487; Belgium 12,639; East Germany 11,427.
Universals, plates, sheets	38,114	51,477	245	U.S.S.R. 13,273; Japan 7,312; Belgium 6,758.
Hoop and strip	149	185	--	Lebanon 63; Belgium 56; Iraq 54.
Rails and accessories	--	60	--	Japan 40; Belgium 20.
Wire	3,312	7,855	--	Romania 2,512; Czechoslovakia 1,268; Poland 839.
Tubes, pipes, fittings	50,842	39,106	736	France 5,934; Japan 5,253; U.S.S.R. 3,757.
Unspecified	900	1,025	--	East Germany 400; Japan 177; Turkey 125.
Lead:				
Oxides	1,142	37	--	United Kingdom 22; France 15.
Metal including alloys:				
Unwrought	2,028	1,377	--	Saudi Arabia 1,286; Lebanon 41.
Semimanufactures	--	29	--	Greece 26; United Kingdom 3.
Nickel: Metal including alloys, all forms	--	17	--	Italy 11; Canada 4; Taiwan 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	--	643	--	Switzerland 547; West Germany 64; United Kingdom 32.
Silver: Metal including alloys, unwrought and partly wrought do.	--	5,851	--	Italy 5,015; United Kingdom 836.
Tin: Metal including alloys:				
Unwrought including scrap	10	--		
Semimanufactures	2	--		
Titanium: Oxides	963	1,338	340	Italy 324; France 298; United Kingdom 198.
Zinc:				
Oxides	77	--		
Blue powder	--	19	--	Romania 16; West Germany 2.
Metal including alloys:				
Unwrought	813	974	--	Belgium 803; Bolivia 100; Japan 31.
Semimanufactures	418	24	--	West Germany 19; Italy 3.
Other: Base metals including alloys, all forms	10	40	30	Turkey 10.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	63	494	--	United Kingdom 392; Belgium 100.
Grinding and polishing wheels and stones	330	582	(2)	Italy 364; West Germany 145.
Asbestos, crude	936	1,047	--	Lebanon 425; Saudi Arabia 252; Botswana 227.
Cement	422,525	704,743	19	Spain 408,365; U.S.S.R. 115,057; Turkey 91,845.
Chalk	2,613	703	--	United Kingdom 290; France 153.
Clays and clay products:				
Crude, unspecified	1,335	2,617	5	Italy 653; United Kingdom 522; Greece 400.

See footnotes at end of table.

Table 3.—Jordan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products —Continued				
Products:				
Nonrefractory	11,798	16,563	84	Italy 8,640; Lebanon 2,754; Spain 2,457.
Refractory including nonclay brick	4,633	5,910	47	Italy 2,040; West Germany 1,110; France 614.
Cryolite and chiolite	--	44	34	West Germany 10.
Diamond:				
Gem, not set or strung carats	--	15,000	--	All from Belgium.
Industrial do	--	5,000	--	All from United Kingdom.
Diatomite and other infusorial earth	--	214	41	France 130; Syria 40.
Feldspar, fluorspar, related materials	294	485	--	India 210; Sweden 101; Turkey 75.
Fertilizer materials: Manufactured:				
Ammonia	143	220	2	Syria 117; Italy 40; Netherlands 34.
Nitrogenous	17,842	9,424	24	Netherlands 2,529; Bulgaria 2,114; Lebanon 1,464.
Phosphatic	16,101	11,516	--	Lebanon 10,219; Saudi Arabia 1,000.
Potassic	144	1,774	--	Netherlands 1,749; West Germany 25.
Unspecified and mixed	4,773	2,685	8	Lebanon 1,461; Netherlands 570; United Kingdom 203.
Graphite, natural	14	--		
Gypsum and plaster	2,456	1,984	--	Syria 889; Lebanon 834; Saudi Arabia 175.
Halogens: Chlorine	55	438	--	Turkey 204; West Germany 153.
Lime	1,450	1,511	--	Lebanon 1,496; United Kingdom 15.
Pigments, mineral:				
Natural, crude	226	--		
Iron oxides and hydroxides, processed	448	86	--	West Germany 53; Spain 33.
Precious and semiprecious stones other than diamond, natural and synthetic carats	30,000	15,000	--	All from United Kingdom.
Pyrite, unroasted	412	--		
Salt and brine	1,422	1,965	14	Lebanon 1,054; Saudi Arabia 855.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	985	812	--	Romania 350; Bulgaria 200; France 110.
Sodium hydroxide	2,229	2,177	--	Romania 1,500; Italy 385; Kuwait 130.
Potassium and sodic peroxides	131	605	--	Lebanon 330; India 197; West Germany 51.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	9,001	8,748	--	Italy 3,820; Turkey 2,208; Lebanon 1,575.
Worked	198	1,420	--	Italy 654; China 291; Greece 273.
Gravel and crushed rock	2,490	2,414	--	Italy 1,120; Turkey 630; Lebanon 594.
Limestone other than dimension	43	--		
Sand other than metal-bearing	1,260	340	--	Lebanon 92; West Germany 75; Italy 70.
Sulfur:				
Elemental:				
Crude including native and by-product	1,144	990	200	Iraq 689; Kuwait 100.
Colloidal, precipitated, sublimed	334	948	--	Iraq 319; France 296; Kuwait 150.
Sulfuric acid	651	260	--	Lebanon 155; Greece 87; Syria 14.
Talc, steatite, soapstone, pyrophyllite	746	365	41	Norway 104; China 75; Austria 36.
Other:				
Crude	76	246	--	United Kingdom 222; Turkey 20.
Slag and dross, not metal-bearing	73	--		
Building material of asphalt, asbestos and fiber cements, unfired nonmetals	2,475	3,586	88	Lebanon 2,361; Italy 665; West Germany 134.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	262	87	--	West Germany 67; United Kingdom 14.
Carbon	241	--		
Coal: All grades including briquets	183	384	39	West Germany 157; Belgium 79; Netherlands 70.
Coke and semicoke	1,301	1,958	1	West Germany 1,191; France 400; Lebanon 335.

See footnotes at end of table.

Table 3.—Jordan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Hydrogen, helium, rare gases	46	66	--	Kuwait 38; Greece 18; West Germany 6.
Peat including briquets and litter	--	40	--	All from Hong Kong.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	12,868	15,850	--	All from Saudi Arabia.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	157,596	371	12	Kuwait 151; Netherlands 104; Saudi Arabia 58.
Gasoline do	1,111	818	--	Saudi Arabia 477; Syria 204; Lebanon 136.
Mineral jelly and wax do	314	1,165	--	West Germany 960; China 181; United Kingdom 16.
Kerosine and jet fuel do	--	471	--	Iraq 455; Syria 16.
Lubricants do	143,081	124,537	17,493	Saudi Arabia 34,209; Belgium 21,665; Romania 11,949.
Residual fuel oil do	--	4,782	--	Belgium 2,557; West Germany 813; Taiwan 513.
Bitumen and other residues do	302	--	--	
Bituminous mixtures	1,400	3,703	758	United Kingdom 818; Netherlands 727; Belgium 303.
Unspecified do	2,583	868	294	Syria 196; Lebanon 140; Japan 98.
Tars and other crude chemicals derived from coal, gas, and petroleum	263	143	47	United Kingdom 37; Lebanon 30.

[1]Included in unwrought for 1980.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Jordan did not produce any raw metals in 1982. Two small steel producers, the Jordan Iron and Steel Co. and the Jordan Pipes Manufacturing Co., were responsible for all of Jordan's steel output of about 100,000 tons per year. The Jordan Iron and Steel plant at Zarqa produced about 50,000 tons per year of steel reinforcing bars, mainly from scrap. Jordan Pipes Manufacturing operated a 120,000-ton-per-year welded pipe plant in Amman. Also, the Arab Aluminum Industry Co. operated a 5,000-ton-per-year aluminum extrusion and anodizing plant in Amman, utilizing imported aluminum ingots.

NONMETALS

Cement.—Output from Jordan's Fuheis cement plant, located 25 kilometers northwest of Amman, declined in 1982 to a level below its new 1.3-million-ton-per-year capacity. The Jordan Cement Factories Co., which owned the Fuheis plant, planned to add two new kilns to the plant, adding 700,000 tons per year to capacity by 1985.

Phosphate Rock.—Production of phosphate rock, Jordan's single largest export commodity, increased slightly in 1982 as the Jordan Phosphate Mines Co. (JPMC) continued to expand and develop the country's vast resources. Phosphate rock was produced in three main areas in Jordan, at Ruseifa, located 14 kilometers north of Amman, Wadi-El-Abyad, 120 kilometers south of Amman, and El-Hasa, 20 kilometers south of Wadi-El-Abyad. A fourth deposit, at Ash-Shidiya, located 50 kilometers northeast of Aqaba in southern Jordan, was being studied for development in the late 1980's. Reserves at Shidiya were estimated at 300 million tons of phosphate rock containing 28% to 34% P_2O_5.

At Ruseifa, the oldest of the country's mines, measured reserves were 50 million tons containing 64.5% bone phosphate of lime (BPL) and an additional 15 million tons indicated reserves containing 65% BPL. Production capacity at Ruseifa was 1 million tons of phosphate rock per year, mined by opencast methods and processed by simple screening and drying. JPMC also oper-

ated a research center at Ruseifa to test various phosphate beneficiation techniques, including hydrocycloning, flotation, and calcining procedures.

The El-Hasa and Wadi-El-Abyad Mines are located on the same concession and are similar geologically. The phosphate occurs in the Belqa series of Upper Cretaceous Age and is found in two main horizons separated by 5 to 20 meters of limestone. Usually the upper horizon contains the higher grade (64% to 72% BPL) phosphate and is the only layer being mined. At El-Hasa, the larger of the two mines, four separate ore bodies are being mined, one of which utilizes a new walking dragline with a 30.6-cubic-meter bucket for overburden stripping. Production capacity at El-Hasa was 3 million tons per year of phosphate rock. The beneficiation process consists of four crushing plants that average 250 to 450 tons per hour each, five beneficiation lines, and eight dryers. Beneficiation is by screening, slurrying and wet screening, hydrocyclone filtering, and then drying. Output from both El-Hasa and Wadi-El-Abyad consists of standard grade 70% to 72% BPL unbeneficiated direct shipping ore, and high grade 73% to 75% BPL beneficiated material produced from 64% to 66% BPL grade ore.

At Wadi-El-Abyad, which began production in 1980, only one of three known ore bodies is being worked. Production capacity was approximately 1.2 million tons per year of phosphate rock, which is processed in two parallel beneficiation lines. A third line was to be added, raising capacity of the mill from 450 to 675 tons per hour of phosphate rock. Measured reserves at Wadi-El-Abyad were 53 million tons of phosphate, containing 65% BPL. Reserves on the combined El-Hasa and Wadi-El-Abyad concession were 158 million tons measured containing 65% BPL, and 40 million tons indicated containing 66% BPL. Phosphate from all three mines was transported by rail and truck to Aqaba for export. Beginning in 1982, some of JPMC's output was delivered to the JFI phosphate fertilizer plant, also located in Aqaba.

JFI's $400 million phosphatic fertilizer complex was brought onstream early in 1982. The plant produces sulfuric acid, phosphoric acid, and diammonium phosphate (DAP) or monoammonium phosphate (MAP) fertilizer from imported sulfur and ammonia and Jordanian phosphate. In 1982, two shipments totaling 35,000 tons of DAP were exported from the plant. The main units of the plant consisted of two identical sulfuric acid units, capable of producing 1,800 tons per day of sulfuric acid utilizing Heurtey Industries' double absorption process; a single 1,250-ton-per-day phosphoric acid unit, which produced three grades of phosphoric acid; two parallel DAP-granulation production units, each capable of producing 1,100 tons per day of either MAP or DAP, and storage facilities for DAP, MAP, and the imported raw materials. Two bagging plants were also operating, used primarily for bagging DAP for export. Attached by conveyor and pipelines to the plant was a newly completed 215-meter pier equipped for double-sided berthing. The operation was capable of simultaneously loading DAP and potash for export and unloading imported solid sulfur and liquid ammonia.

Also under construction at the plantsite was a 20,000-ton-per-year aluminum fluoride plant being built by Davy McKee Corp. (United Kingdom). The plant was to utilize fluorosilicic acid, a byproduct of phosphoric acid production, to produce aluminum fluoride for export to neighboring aluminum-producing countries.

Potash.—Production commenced in 1982 from the APC Dead Sea potash project, located at Ghor-al-Sufi, near the Lisan Peninsula on the banks of the Dead Sea in central Jordan. The APC was a joint venture of the Jordan Government (51%), the Arab Mining Co. (25%), and other Arab Governments and private shareholders. The project was being managed under contract until 1985 by Jacobs Engineering Ltd. of the United States, which was the construction manager for the entire operation.

Potash muriate is recovered from Dead Sea brines, which are pumped from an offshore area in the Dead Sea and conveyed by gravity along a 10-kilometer canal to a large salt pan. Following the first stage of solar evaporation, NaCl is precipitated, leaving a saturated solution of carnallite ($KCl\text{-}MgCl\text{-}6H_2O$). The brine is then pumped into two precarnallite pans, where further NaCl precipitation occurs. Finally, the remaining solution is pumped into three carnallite pans, where carnallite is crystallized just below the water's surface. The carnallite is harvested from one pan each year by using three laser-guided harvesting machines that crawl along semisubmerged on caterpillar tracks. The carnallite is scooped up and pushed into a trailing flexible floating pipeline. The slurry then reaches a booster pump at the edge of the

pan and is pipelined to the refinery.

In the refinery, the slurry is dewatered and MgCl is leached out, leaving a slurry of synthetic sylvinite. The sylvinite is then hot leached and passed through multieffect evaporators to separate the remaining NaCl, leaving a crystal slurry of potassium chloride (KCl). The KCl is then dewatered, washed, dried, cooled, and treated with anticaking agents. The process produces standard, granular, and coarse grades of KCl in about equal quantities, with total production capacity equal to 1.2 million tons per year of KCl of all grades. Full capacity could be reached by 1984. All of the plant's output has been contracted for up through 1987 on a take or pay basis f.o.b. at Aqaba. APC was also planning to construct facilities to recover magnesium, bromine, and potassium sulfate as byproducts from the refinery effluent.

MINERAL FUELS

Despite its continuing exploration efforts, Jordan had yet to locate any commercial quantities of oil or gas. In 1981, the National Resources Authority (NRA) reported an oil strike at 805 meters depth in the al-Azraq region, 70 kilometers east of Amman, by the Yugoslav contractor Naftagas. Following that report, the NRA drew up an $85 million 5-year exploration program to cover the Azraq region and other high potential areas. All exploration work is being carried out by the NRA, with any foreign assistance being provided on a contract basis without any concession rights. Further exploration work in the area has failed to locate any commercial reserves, but new wells were still being drilled in the area at the end of 1982.

All of Jordan's domestic petroleum requirements are supplied by TAPline, and refined in the Jordan Petroleum Refinery Co.'s 60,000-barrel-per-day refinery at Zarqa. Capacity of the refinery was expanded from 35,000 to 60,000 barrels per day crude throughput in 1982, which makes Jordan self-sufficient in refined products. The expansion was achieved through the addition of new hydrocracking and distillation units, along with a new liquefied petroleum gas production unit, at a total cost of $175 million.

Also under construction at the refinery was a small petrochemical plant, capable of producing annually 10,000 tons of polyester, 4,000 tons of plasticizers, and 5,000 tons of polyvinyl chloride. Rio Rodano was constructing the plant, which was scheduled for completion early in 1983.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Jordanian dinars (JD) to U.S. dollars at the rate of JD0.352=US$1.00.

The Mineral Industry of Kenya

By Thomas O. Glover[1]

In 1982, the growth of the mining and quarrying sector of Kenya's economy remained relatively unchanged. The real gross domestic product (GDP) was estimated to be $3.7 billion,[2] with the mining and quarrying sector accounting for less than 1% of GDP. Balance-of-payment constraints and structural problems continued to dampen economic activity while accelerating inflation. In December, the Kenyan shilling was devalued for a third time in less than 2 years. The economy remained vulnerable to energy costs as energy imports absorbed 57% of foreign exchange. Kenya has moved ahead in diversifying its energy sources by shifting much of its electricity production to hydroelectric and geothermal powerplants. Kenya's main domestic power source was hydroelectric and derived mainly from power stations on the Tana River; however, the potential for expanding domestic hydropower was comparatively limited. Kenya's domestic power requirements were forecast to grow at an annual rate of 7% with plans to increase the use of geothermal energy as the future major power source.

Early in 1982, the International Bank for Reconstruction and Development (World Bank) agreed to provide a $40 million loan for the geothermal project at Olkaria, 100 kilometers northwest of Nairobi, where the Kenya Power Co. believes there is the potential to produce about 700 megawatts of electricity.

In the mineral exploration sector, work was continued on the Samburu-Marsabit mapping and mineral exploration project in north-central Kenya. The 4 year, $55 million program was begun in 1981 and involves staffs from Kenya's Mines and Geological Department and the United Kingdom's Institute of Geological Sciences. In 1980, a technical assistance agreement was signed between the Kenyan Government and Geologinen Tutkimuslaitos of Finland for an industrial minerals development program. A new unit was established in 1982 within the Environment and Natural Resources Ministry with a mission to make a countrywide survey for industrial minerals including limestone, gypsum, asbestos, and diatomite.

PRODUCTION AND TRADE

The principal mineral commodities produced continued to be soda ash and fluorspar. Soda ash was Kenya's leading mineral export, with most going to the Philippines, Indonesia, and Malaysia. Production of soda ash was targeted to reach 300,000 tons in 1982, and was planned to reach 550,000 tons in 1985.

Kenya was Africa's second largest fluorspar producer, with exports mainly to the U.S.S.R., Greece, Japan, and the Federal Republic of Germany. The falling prices of fluorspar created financial difficulties for the new Kerio Valley Mine.

Cement production has continued to rise since 1980, with exports going to Mauritius Oman, and Reunion.

Table 1.—Kenya: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[e]	1982[p]
METALS					
Beryl, gross weight	--	(2)	(2)	--	--
Gold, mine output, metal content—troy ounces	205	e200	125	100	21
Iron and steel:					
Iron ore:					
Gross weight	20,129	20,000	14,567	14,000	4,310
Iron content[e]	12,077	12,000	9,469	9,000	NA
Steel, crude[e]	10,000	10,000	10,000	10,000	NA
NONMETALS					
Barite	298	e300	6,647	6,000	--
Cement, hydraulic—thousand tons	1,125	851	1,272	1,300	e1,300
Clays: Kaolin	1,514	e1,500	1,487	1,400	1,077
Corundum	(2)	e(2)	(2)	--	(2)
Diatomite	1,690	1,266	1,677	1,700	1,783
Feldspar	949	e1,000	387	400	--
Fluorspar	106,564	77,104	93,378	90,000	88,726
Gem stones, precious and semiprecious:					
Amethyst—kilograms	--	--	--	--	3
Aquamarine—do.	275	NA	35	NA	(2)
Garnet[3]—do.	274	NA	237	NA	63
Ruby—do.	316	NA	414	NA	--
Sapphire—do.	1	NA	148	NA	33
Tourmaline—do.	23	NA	39	NA	11
Gypsum and anhydrite	3,696	NA	--	--	300
Lime	r e50,000	27,000	26,025	27,000	21,941
Magnesite	e4,000	e4,000	1	10	--
Phosphatic materials: Guano	19,943	NA	--	50	(2)
Salt:					
Crude	19,514	21,846	26,966	27,000	NA
Refined	e12,000	e12,000	20,050	21,000	24,411
Sodium compounds, n.e.s.:					
Soda, crushed, raw	114	NA	1,530	1,600	2,412
Soda ash	152,522	223,845	203,768	250,000	160,440
Stone, sand and gravel:					
Calcareous:					
Calcite	e600	NA	--	NA	--
Coral (for cement manufacture)[e]	950,000	NA	(4)	1,000,000	1,442,928
Kunkur (for cement manufacture)	111,647	NA	121,460	125,000	NA
Limestone (for cement manufacture)	e50,000	NA	41,540,777	500,000	--
Sand	23,758	NA	5960	25,000	NA
Shale	257,402	NA	295,183	300,000	259,426
Vermiculite	1,863	2,260	2,558	2,600	1,556
Wollastonite	100	NA	--	50	--
MINERAL FUELS AND RELATED MATERIALS					
Carbon dioxide, natural	2,243	NA	3,014	3,000	2,700
Petroleum refinery products:					
Gasoline, motor—thousand 42-gallon barrels	3,230	4,060	3,629	NA	NA
Jet fuel—do.	3,023	4,209	3,492	NA	NA
Distillate fuel oil—do.	4,103	1,211	4,540	NA	NA
Residual fuel oil—do.	7,925	7,574	e8,824	NA	NA
Other:					
Asphalt—do.	e212	24	188	NA	NA
Liquefied petroleum gas—do.	232	186	280	NA	NA
Unspecified—do.	e70	461	693	NA	NA
Refinery fuel and losses—do.	e809	932	679	NA	NA
Total—do.	19,604	18,657	22,325	22,000	22,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 29, 1983.

[2]Less than 1/2 unit.

[3]Quality (gem or industrial) not specified.

[4]Coral for cement manufacture apparently has been included with limestone for cement manufacture.

[5]Probably an incomplete figure.

[6]Includes some fuel oil also described as unfinished oil.

COMMODITY REVIEW

METALS

Production of metallic minerals in Kenya was virtually nil. A small amount of magnetite was produced in 1982.

One small reverse cold-rolling steel mill, constructed in 1978, was operated in Mombasa during 1982. A second mill, with a capacity of 100,000 tons per year, was planned for construction in Mombasa by Kenya Steel Co.

NONMETALS

Cement.—Cement production continued to increase in Kenya. Two large producers, Bamburi Portland Cement Co. and the East African Portland Cement Co., operated plants near Mombasa and Nairobi, respectively. Bamburi upgraded its two rotary kilns by installing precalciners. Both kilns have been converted to coal firing from oil and are scheduled to start up in early 1983. Bamburi exports approximately 75% of its production, most of it to countries in the Arab Gulf. In 1982, Bamburi was encountering stiff competition from other exporting countries. Greece, Japan, the Republic of Korea, and Spain stepped up their production and priced their cement at a level that Bamburi was having trouble meeting.

Fertilizer Materials.—National Agricultural Chemicals & Fertilizers of Kenya Ltd. was building a fertilizer facility at Mombasa. The plant's capacity was 100,000 tons per year of nitrogen in the form of calcium-ammonium nitrate and 130,000 tons per year of diammonium phosphate and monoammonium phosphate. Stamicarbon B.V. was the designer for both units that are scheduled for commissioning in 1984. The new plant should encourage domestic consumption of the fertilizer materials and produce a sizable surplus for export.

Fluorspar.—The Kenya Fluorspar Co. Ltd. (KFC) was a wholly owned Kenyan Government company operating a mine and fluorspar concentrator in the Kerio Valley of Western Kenya. KFC ranked as one of the country's leading foreign exchange earners and was at the forefront of development in this remote area. The mine was situated 400 kilometers by road northwest of Nairobi. The original fluorspar deposits were discovered in 1967, with approximately 737,000 tons of ore having been removed from 1967 through 1981. The majority of the fluorspar was acid grade. The projected life of the open cast mine based on current proven ore reserves was 10 years at an annual production rate of 310,000 tons.

Soda Ash.—Soda ash remained Kenya's principal foreign exchange earner in the minerals sector. The production of soda ash, at Magadi Soda Co. south of Nairobi, was targeted to reach 300,000 tons per year in 1982. Magadi also produced approximately 3,500 tons per month of salt by solar evaporation for the domestic market. The company planned to expand its production capacity for soda ash to 550,000 tons per year. This required improvements to existing infrastructural support facilities including additional power, a new deepwater berth to complement improved handling facilities at the Port of Mombasa, and additional rolling stock for Kenya Railways.

MINERAL FUELS

Kenya, which imported 100% of its petroleum, passed new oil production regulations. The operating regulations were published in the Kenya Gazette in May. The regulations are divided into three parts, nonexclusive exploration license, oil exploration and mining license, and fees and royalties. The regulations cover crude oil, natural gas, and hydrocarbons produced from oil shales and tar sands.

Kenya offered to lease six tracts of land, both onshore and offshore, ranging in size from 12,000 to 27,000 square kilometers. Previous leasing over the past two decades had involved 16 wells drilled, 16,500 line kilometers of onshore seismic, and 5,300 line kilometers of offshore seismic.

The Mombasa refinery was shut down in October for a short period owing to Government cutbacks in foreign exchange for oil imports. The refinery exports to Uganda, Rwanda, Burundi, and parts of Zaire.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Kenyan shillings (K Sh) to U.S. dollars at the rate of K Sh13.035 = US$1.00 for 1982.

The Mineral Industry of the Republic of Korea

By E. Chin[1]

The Republic of Korea's gross national product (GNP) was $60.5 billion in 1981 compared with $64.3 billion in 1982 at current market prices.[2] In constant 1975 prices, the GNP was $30.6 billion in 1981 and $32.2 billion in 1982, reflecting a real growth of 5%. Input by sector to GNP in 1982 was as follows: manufacturing, 34%; wholesale and retail trade, 19%; agriculture, forestry, and fishing, 18%; transport, storage, and communication, 9%; business services, 7%; construction, 7%; and other, 6%. Mining and quarrying accounted for only $386 million in 1982 compared with $398 million in 1981.

In 1982, employment in the mining sector totaled 110,000 persons, and monthly earnings averaged about $367. Monthly earnings in metal mining were $397; followed by coal, $387; and other mining, $267. In comparison, monthly earnings in selected manufacturing sectors were petroleum refining, $734; iron and steel, $379; nonmetallic mineral products, $350; industrial chemicals, $347; nonferrous metals, $263; and fabricated metal products, $262. The national average for monthly earnings was $283 based on 24.9 workdays.

The wholesale price index (1980=100) for all commodities was 126.0 in 1982 compared with 120.4 in 1981. Between 1981 and 1982, the wholesale price index for producer goods increased from 121.3 to 127.5; capital goods, from 111.5 to 119.8; and consumer goods, from 120.4 to 124.8. Wholesale prices for selected commodities in 1982 were compound fertilizers, $254 per ton; cement, $60 per ton; hot-rolled steel coil, $313 per ton; gold, $403 per troy ounce; copper, $2,111 per ton; premium gasoline, $1.24 per liter; and bunker C oil, $0.24 per liter.

Total electric power generated was 43.1 billion kilowatt-hours, of which 96% was from thermal powerplants. Consumption by various industries was as follows, in billion kilowatt-hours: primary metals, 5.1; chemicals, 4.6; nonmetals and metal products, each 2.9; and mining, 0.7. Consumption by the residential sector totaled 6.6 billion kilowatt-hours, and for the public sector, 1.4 billion kilowatt-hours.

Total rail freight transportation was 46.8 million tons. Railway tonnage of selected commodities was as follows, in million tons: anthracite coal, 19.6; cement, 9.5; minerals, 3.9; fertilizers, 1.9; and ferrous materials, 0.4.[3]

During the past two decades, the Republic of Korea has vigorously garnered foreign capital to supplement domestic capital for its industrialization and modernization. During the first economic development plan (1962-66), loans and foreign investments totaled $0.3 billion; during the second development plan (1967-71), $2.3 billion; during the third plan, $6.0 billion; and during the fourth plan (1977-80), $14.0 billion. During the fifth economic development plan (1982-86), the Government projected fixed capital formation at $109 billion. Foreign capital to be induced was estimated as follows, in billion dollars: bank loans, 33.3; foreign currency bonds, 1.7; and short-term loans and other sources, 11.5. During the current economic plan, only 0.7% of the total fixed capital formation was designated, however, for the mining sector.[4] Major projects scheduled for implementation during 1982-86 include expansion of existing shipbuilding capacity and construction of nuclear powerplants, a shipyard, two liquefied natural gas import terminals, and a 3-million-ton-per-year integrated steel complex.[5]

According to the Ministry of Energy and

Resources, seven companies were conducting minerals development in foreign countries. With the exception of Pohang Iron and Steel Co. Ltd. (Posco), the other six companies have established joint ventures with foreign firms. In addition, four companies were planning overseas minerals projects in joint ventures with foreign counterparts. Of the 27 overseas projects planned or in progress, 14 were for bituminous coal, 6 for anthracite, 2 for copper, 2 for iron ore, and 3 for crude oil. Overseas projects in effect during 1982 were in Australia, Canada, Gabon, Indonesia, Paraguay, and the United States.

The Government of the Republic of Korea, a signatory to the International Law of the Sea Treaty, plans to spend $30 million for the exploration of seabed manganese nodules and an additional $30 million for the experimental harvesting of seabed nodules during 1984-89. A 150,000-square-kilometer mining zone in the Pacific was to be set up by the end of 1984. If the mining plan is viable, further investment was to be made for ship procurement and the construction of a coastal receiving terminal and metals refining facilities.

PRODUCTION

In terms of world output, the Republic of Korea is a significant producer of graphite, kaolin, pyrophyllite, talc, and tungsten. Although anthracite coal was the most important sector by volume and value of output, production only averaged 18 million tons annually during the past 10 years. There is limited domestic mine output of copper, fluorite, gold, iron ore, lead, silver, and zinc.

Most of the Republic of Korea's mineral raw materials for its industrial needs are imported. For instance, production of primary metals such as aluminum, copper, and iron and steel is largely from imported ores and concentrates. Significantly, there is no domestic production of oil and natural gas.

The industrial production index (1980=100) for all items in 1982 was 118.1 compared with 96.9 for mining and 119.2 for manufacturing. The index for coal mining was 94.8; for metal mining, 97.9; and for all other mining, 103.7. Other indices included petroleum refining, 99.0; nonmetal mineral products, 107.0; iron and steel, 135.0; nonferrous metals, 174.6; and fabricated metal products, 136.3.

Table 1.—Republic of Korea: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum metal, primary	20,155	21,751	17,643	17,506	15,226
Arsenic, mine output, white arsenic equivalent	548	NA	NA	169	306
Bismuth metal	122	87	123	100	95
Cadmium metal, smelter	40	50	365	300	300
Copper:					
Mine output, metal content	715	475	372	501	533
Metal:					
Smelter	[r]45,900	48,200	64,100	101,200	97,400
Refined, primary	52,442	63,082	72,931	107,984	110,818
Gold metal troy ounces	27,393	24,081	41,218	43,147	55,750
Iron and steel:					
Ore and concentrate:					
Gross weight thousand tons	693	639	619	594	553
Iron content do	388	358	347	333	310
Pig iron do	2,741	5,063	5,577	7,928	8,445
Ferroalloys:					
Ferromanganese	[r]46,200	53,000	54,279	68,300	60,306
Ferrosilicon	30,800	38,000	29,712	32,000	32,478
Other	[r]1,884	21,151	24,994	27,185	33,240
Total	78,884	112,151	108,985	127,485	126,024
Steel, crude thousand tons	4,969	7,610	8,558	10,753	11,753
Lead:					
Mine output, metal content	16,100	11,073	11,457	13,635	10,296
Metal, smelter	7,218	7,600	5,479	9,257	16,094
Manganese ore and concentrate:					
Gross weight	747	35	81	--	--
Manganese content	299	14	32	--	--
Molybdenum, mine output, metal content	220	189	300	464	361

See footnotes at end of table.

Table 1.—Republic of Korea: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS —Continued					
Silver metal thousand troy ounces	1,385	2,278	2,292	3,061	1,444
Tin, mine output, metal content	20	31	8	--	--
Tungsten, mine output, metal content	2,681	2,713	2,737	2,739	2,233
Zinc:					
Mine output, metal content	66,440	62,477	56,787	56,198	59,070
Metal, primary	58,970	83,014	79,150	83,915	99,211
NONMETALS					
Asbestos	13,616	14,804	9,854	14,084	15,933
Barite	[r]1,133	728	410	--	--
Cement, hydraulic thousand tons	[r]15,616	16,413	15,631	15,617	17,887
Clays: Kaolin	[r]549,940	[r]698,432	577,761	694,584	174,918
Diatomaceous earth	18,845	23,915	25,101	42,176	55,249
Feldspar	69,200	36,238	71,972	103,263	85,040
Fluorspar, metallurgical-grade	11,368	8,450	6,912	6,464	3,667
Graphite:					
Crystalline	2,534	2,453	1,429	842	627
Amorphous	53,785	54,240	59,157	34,049	20,338
Total	56,319	56,693	60,586	34,891	20,965
Kyanite and related materials: Andalusite	61	60	82	90	NA
Lime, slaked thousand tons	60	[r]NA	210	NA	NA
Mica: All grades	16,923	10,005	10,330	NA	20,355
Nitrogen: N content of ammonia	896,911	960,623	847,871	746,723	543,302
Pyrites, gross weight	--	562	460	--	--
Salt	650,000	500,000	455,000	602,000	864,000
Sodium compounds: Sodium carbonate, manufactured	176,090	203,792	221,920	202,063	185,670
Stone, sand and gravel:					
Agalmatolite	397,573	430,890	371,932	302,975	NA
Limestone thousand tons	24,153	28,112	28,024	27,931	29,332
Quartzite do	265	392	291	545	490
Sand including glass sand do	348	513	510	585	657
Sulfur: S content of pyrites	--	169	138	--	--
Talc and related materials:					
Pyrophyllite	463,005	541,383	514,511	395,216	466,324
Talc	202,078	236,824	204,662	169,401	124,793
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	51,989	58,284	74,122	57,329	58,047
Coal: Anthracite thousand tons	18,054	18,208	18,624	19,865	18,382
Coke do	1,319	2,331	2,965	4,401	4,539
Fuel briquets: Anthracite briquets	NA	16,942	17,000	18,543	20,865
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	7,989	8,712	6,759	6,184	5,182
Jet fuel do	5,390	5,495	4,920	5,409	6,521
Kerosine do	6,791	8,912	8,884	8,124	8,368
Distillate fuel oil do	34,444	38,056	38,527	39,167	41,701
Residual fuel oil do	85,953	91,135	91,412	86,613	81,679
Lubricants do	1,386	1,512	1,403	1,507	2,081
Other do	26,168	27,747	29,709	30,744	26,577
Refinery fuel and losses[e] do	5,857	7,024	1,247	5,068	6,260
Total do	173,978	188,593	182,861	182,816	178,369

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through June 23, 1983.

TRADE

During the past 22 years, a spectacular growth occurred in the Republic of Korea's foreign trade. In 1960, total trade was only $0.4 billion; in 1970, $2.8 billion; and in 1980, $39.8 billion. Total trade during 1982 topped $46.1 billion. Throughout the 22-year period, however, an annual trade deficit was incurred in the Republic of Korea's current account because the value of imports exceeded the value of exports.

In 1982, total exports were $21.9 billion. Major destinations were the United States with $6.2 billion; Japan, $3.4 billion; United Kingdom, $1.1 billion; Hong Kong, $0.9 billion; Canada, Indonesia, and Singapore, each with $0.4 billion; and Australia, $0.3 billion. Shipments of machinery and transport equipment totaled $6.0 billion; other manufactured goods, $13.2 billion; food products, $1.1 billion; and other exports, $1.6 billion.

Imports totaled $24.2 billion; major sup-

plying countries were the United States, $6.0 billion; Japan, $5.3 billion; Australia, $0.9 billion; Kuwait, $0.8 billion; Indonesia and the Federal Republic of Germany, each with $0.7 billion; and Malaysia, $0.6 billion. Receipts of mineral fuels and related materials were the largest class, valued at $7.6 billion, followed by machinery and transport equipment, $6.0 billion; crude raw materials and manufactures, each $3.4 billion; chemicals, $2.1 billion; food products, $1.6 billion; and other, $0.1 billion.

The Republic of Korea has established industrial estates that consume raw materials, largely imported, to produce value-added goods for export. The country's major manufacturing cities (type of industrial estate given in parentheses) are Gumi (electronics), Ulsan (petrochemicals and shipbuilding), Onsan (nonferrous metals), Changwon (machinery), Mason (free export zone), Yeocheon (petrochemicals), and Iri (free export zone). Korea Trade Promotion Corp. is a state-run enterprise charged with strengthening economic cooperation and trade relations with foreign countries. The Republic of Korea's general trading companies, which are large and deal with diverse commodities, include Bando Sangsa Co. Ltd., Daewoo Corp., Hyosung Corp., Hyundai Corp., Korea Trading International Inc., Kukje Corp., Kumho & Co. Inc., Samsung Co. Ltd., Ssangyong Corp., and Sunkyong Ltd.[6]

Table 2.—Republic of Korea: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	22	45	--	Bangladesh 23; Indonesia 10; Pakistan 10.
Metal including alloys:				
Unwrought	1,531	935	--	Japan 785; Taiwan 150.
Semimanufactures	11,920	36,053	16	Saudi Arabia 27,819; Kuwait 1,085; Hong Kong 811.
Antimony: Metal including alloys, all forms	4	20	--	India 17.
Cadmium: Metal including alloys, all forms	314	336	310	Japan 26.
Chromium: Oxides and hydroxides	224	--		
Cobalt: Metal including alloys, all forms kilograms	68	--		
Copper:				
Sulfate	68	--		
Metal including alloys:				
Scrap	627	250	--	All to Japan.
Unwrought	5,243	3,387	--	Japan 2,929; Taiwan 350; United Kingdom 108.
Semimanufactures	4,083	12,981	1,084	Taiwan 2,950; Thailand 1,283; Singapore 641.
Gold:				
Ore and concentrate value	--	$10,766	--	All to Japan.
Metal including alloys, unwrought and partly wrought troy ounces	8,512	11,260	11,212	Japan 47.
Iron and steel:				
Pyrite, roasted	--	17	--	All to Japan.
Metal:				
Scrap	9,675	25,109	--	Indonesia 11,500; Thailand 9,997; Japan 3,600.
Pig iron, cast iron, related materials	151,049	1,169,634	28	Indonesia 1,015,750; Japan 150,600; Saudi Arabia 1,153.
Ferroalloys	2,500	167	15	Japan 150.
Steel, primary forms thousand tons	1,209	5,557	85	Taiwan 4,396; Japan 644.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	1,027	1,147	17	Saudi Arabia 536; Japan 107; India 106.
Universals, plates, sheets do	1,530	1,606	236	Japan 594; Indonesia 95; Singapore 81.
Hoop and strip	21,888	72,327	4,635	Saudi Arabia 23,620; Indonesia 8,220; Singapore 4,275.
Rails and accessories	3,825	10,821	1,397	Taiwan 8,707; Japan 211; Saudi Arabia 207.
Wire	75,578	137,189	8,035	Saudi Arabia 92,032; United Arab Emirates 4,688.
Tubes, pipes, fittings	826,112	1,222,759	793,783	Saudi Arabia 221,168; Japan 32,210.
Castings and forgings, rough	11,504	14,648	7,042	Japan 3,671; Singapore 1,826.

Table 2.—Republic of Korea: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	4,000	8,400	--	All to Japan.
Oxides	11	--		
Metal including alloys:				
Scrap	708	18	--	Sri Lanka 14; Saudi Arabia 4.
Unwrought	3,320	93	--	Japan 50; Saudi Arabia 10.
Semimanufactures	143	102	8	Saudi Arabia 47; Spain 24.
Magnesium: Metal including alloys, scrap	30	32	--	All to Japan.
Manganese: Ore and concentrate, battery-grade	165	--		
Metalloids: Arsenic, oxides and acids	116	337	250	Indonesia 40; West Germany 16; Netherlands 16.
Molybdenum:				
Ore and concentrate	322	651	--	Canada 357; United Kingdom 109; West Germany 90.
Metal including alloys, semimanufactures, kilograms	964	--		
Nickel: Metal including alloys:				
Scrap	56	33	--	All to Japan.
Unwrought	18	3	--	Do.
Semimanufactures	7	7	--	Papua New Guinea 3; Japan 2; Libya 1.
Platinum-group metals:				
Waste and sweepings, value	$62,746	$5,542	$5,542	
Metal including alloys, unwrought and partly wrought, troy ounces	4,378	445,477	444,644	Japan 833.
Silver:				
Ore and concentrate, value, thousands	$10,067	$4,773	$4,773	
Waste and sweepings, value	$61,700	--		
Metal including alloys, unwrought and partly wrought, thousand troy ounces	1,137	1,711	1,126	Japan 350.
Tin: Metal including alloys, semimanufactures	18	28	--	Saudi Arabia 8; Libya 7; Burma 5; Nigeria 5.
Tungsten:				
Ore and concentrate	1,712	6,360	61	Sweden 4,989; Japan 690; West Germany 229.
Metal including alloys, all forms	604	656	475	Japan 138; West Germany 24.
Zinc:				
Oxides	1,490	1,829	--	Japan 1,752; Sudan 65.
Blue powder	38	331	--	Australia 306.
Metal including alloys:				
Scrap	255	2,200	--	Japan 1,200; Indonesia 900; Pakistan 100.
Unwrought	11,612	8,391	500	Japan 6,810; Bangladesh 341; Taiwan 265.
Semimanufactures	54	11,107	1	Saudi Arabia 11,046.
Other:				
Ashes and residues	2,006	51,062	--	Japan 51,011.
Pyrophoric alloys	--	23	--	Japan 22.
Base metals including alloys, all forms	9	(1)	(1)	
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,000	26	--	Japan 13; Yemen Arab Republic 9; Saudi Arabia 4.
Dust and powder of precious and semiprecious stones, kilograms	1,576	186	--	Canada 110; Japan 76.
Grinding and polishing wheels and stones	226	11,180	11	Saudi Arabia 11,095.
Asbestos, crude	30	40	--	All to Japan.
Cement, thousand tons	4,754	6,635	(1)	United Arab Emirates 1,128; Saudi Arabia 965; India 734.
Chalk	--	1	--	All to Saudi Arabia.

See footnotes at end of table.

Table 2.—Republic of Korea: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude:				
Bentonite	10	1,600	--	Japan 1,100; Taiwan 500.
Chamotte and dinas earth	29,335	24,099	--	All to Japan.
Kaolin	76,920	88,127	--	Japan 78,902; Taiwan 8,600; Philippines 500.
Unspecified	3,097	1,277	--	Japan 1,270.
Products:				
Nonrefractory	62,747	76,348	37,070	West Germany 7,614; Hong Kong 5,816; Japan 4,383.
Refractory including nonclay brick	15,792	12,453	10,543	Malaysia 790; Japan 221.
Diamond:				
Natural: Gem, not set or strung value	$842,788	$1,850,796	--	Japan $1,727,722; Hong Kong $100,900; Singapore $16,044.
Synthetic and reconstructed: Gem, not set or strung do	$23,233	$348,920	--	Japan $321,036; Malaysia $27,884.
Feldspar, fluorspar, related materials:				
Feldspar	19,672	18,538	--	Taiwan 16,259; Thailand 1,600; Japan 550.
Fluorspar	500	--		
Fertilizer materials: Manufactured:				
Nitrogenous	635,257	393,946	5,000	Indonesia 132,089; Philippines 65,011; Taiwan 48,400.
Phosphatic	33,875	37,350	--	Japan 27,000; Fiji 7,350; Kenya 3,000.
Potassic	--	2,500	--	All to Fiji.
Unspecified and mixed	624,253	316,911	--	Philippines 45,451; Turkey 41,925; Thailand 24,608.
Graphite, natural	45,416	34,348	--	Japan 19,757; Taiwan 7,820; Indonesia 5,283.
Gypsum and plaster	79,819	160,884	--	Japan 97,546; Taiwan 28,469; Hong Kong 19,850.
Lime	10,873	5,866	--	Papua New Guinea 3,217; Indonesia 1,500; Japan 590.
Magnesium compounds: Magnesite	1,000	--		
Mica: Crude including splittings and waste	--	10	--	All to Taiwan.
Pigments, mineral: Iron oxides and hydroxides, processed	26	54	--	All to Japan.
Precious and semiprecious stones other than diamond:				
Natural kilograms	25,469	2,239	156	Japan 2,065.
Synthetic value, thousands	$6,447	$12,422	$8,152	Hong Kong $1,274; Japan $1,148.
Salt and brine	99	11,711	33	Qatar 9,000; Libya 2,607.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	3	--		
Sodium carbonate, natural and manufactured	11,614	1,055	--	Kuwait 900; New Zealand 105; Philippines 50.
Sodium hydroxide	40,307	15,494	--	Japan 10,632; Philippines 1,839; Hong Kong 1,754.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	312,483	255,282	--	Japan 253,154; Taiwan 1,724.
Worked	49,564	54,498	15	Japan 53,867; Saudi Arabia 607.
Dolomite, chiefly refractory-grade	96,400	130,800	--	All to Japan.
Gravel and crushed rock	1,873	1,325	--	Japan 460; Philippines 300; Taiwan 270.
Quartz and quartzite	30,872	123,005	--	Japan 122,855.
Sand other than metal-bearing	5,206	7,400	--	All to Japan.
Sulfur:				
Elemental, crude including native and byproduct	1,603	880	--	Indonesia 765; Singapore 68.
Sulfuric acid	23	1,529	--	Taiwan 1,460.
Talc, steatite, soapstone, pyrophyllite	53,478	50,444	1,430	Japan 26,945; Thailand 7,110; Philippines 6,230.
Other:				
Crude	284,531	189,188	--	Japan 110,430; Taiwan 73,953.
Slag and dross, not metal-bearing	53,500	63,026	--	Japan 62,324.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	5,157	27,308	16	Saudi Arabia 23,806; Kuwait 902; Hong Kong 657.

See footnotes at end of table.

Table 2.—Republic of Korea: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Coke and semicoke	(2)	2	--	All to Saudi Arabia.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	132	76	9	Japan 25; Netherlands 14; Jordan 12.
Mineral jelly and wax do	7	49	--	Hong Kong 29; Singapore 5; Taiwan 4.
Kerosine and jet fuel do	9	711	--	All to Japan.
Distillate fuel oil do	r25	1,099	--	Japan 757; Thailand 194; Indonesia 121.
Lubricants do	r86	78	(1)	Japan 52; Indonesia 20.
Nonlubricating oils do	(1)	9	--	Mainly to Thailand.
Residual fuel oil do	r671	255	--	Guam 210.
Bitumen and other residues do	r13	7	--	Mainly to Japan.
Naphtha do	--	40,348	183	Japan 40,006.
Tars and other crude chemicals derived from coal, gas, and petroleum	125,447	106,755	--	Japan 76,373; Canada 8,600; Taiwan 8,285.

rRevised.
[1]Less than 1/2 unit.
[2]Revised to zero.

Table 3.—Republic of Korea: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium:				
Ore and concentrate	8	(1)	(1)	Japan.[1]
Oxides and hydroxides	12	23	10	Taiwan 8; Japan 5.
Alkaline-earth metals	14	18	1	Japan 16.
Rare-earth metals	1	1	--	Mainly from West Germany.
Aluminum:				
Ore and concentrate	2,247	4,907	--	Hong Kong 4,743.
Oxides and hydroxides	30,940	36,444	14	Japan 36,430.
Ash and residue containing aluminum	28,387	29,412	556	Japan 27,616.
Metal including alloys:				
Scrap	3,868	5,699	3,987	Japan 1,594.
Unwrought	73,821	98,583	27,668	Canada 16,371; Venezuela 9,028; United Arab Emirates 8,892.
Semimanufactures	19,610	12,537	1,447	Japan 6,041; Australia 1,543; France 1,134.
Antimony:				
Ore and concentrate	224	547	--	Thailand 293; Malaysia 81; Austria 60; Bolivia 60.
Oxides	52	100	--	Japan 49; United Kingdom 21; Bolivia 10.
Metal including alloys, all forms	NA	5	--	All from Bolivia.
Beryllium: Metal including alloys, all forms kilograms	1,000	--		
Bismuth: Metal including alloys, all forms	NA	25	--	All from Japan.
Cadmium: Metal including alloys, all forms	NA	--		
Chromium:				
Ore and concentrate	5,264	3,501	--	Philippines 2,675; Japan 826.
Oxides and hydroxides	1,147	1,231	356	Japan 702; West Germany 56.
Cobalt:				
Oxides and hydroxides	9	8	--	Canada 2; Japan 2; United Kingdom 2.
Metal including alloys, all forms	NA	54	(1)	Zaire 14; Japan 12; Netherlands 8.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Columbium and tantalum: Metal including alloys, all forms, tantalum ____ kilograms	NA	11	9	Japan 2.
Copper:				
Ore and concentrate	233,999	382,919	17,538	Philippines 178,425; Chile 61,439; Canada 61,252.
Matte and speiss including cement copper	3,341	2,398	455	Australia 1,937.
Oxides and hydroxides	42	49	10	Japan 38.
Metal including alloys:				
Scrap	19,637	25,736	21,175	Canada 835; Singapore 774; Hong Kong 707.
Unwrought	15,471	28,675	1,493	Japan 10,667; Peru 4,875; Zambia 4,506.
Semimanufactures	14,472	15,200	449	Japan 10,752; Canada 2,783.
Gold:				
Ore and concentrate ____ value	$375,638	--		
Metal including alloys, unwrought and partly wrought ____ troy ounces	128,380	25,605	10,836	Japan 13,170; Taiwan 685.
Indium: Metal including alloys, all forms ____ kilograms	NA	226	44	Japan 182.
Iron and steel:				
Iron ore and concentrate thousand tons	9,142	10,688	--	Australia 3,974; India 2,606; Peru 2,058.
Metal:				
Scrap ____ do	1,932	2,310	1,977	Australia 171; Japan 117.
Pig iron, cast iron, related materials	23,434	66,061	15	Taiwan 37,296; Hong Kong 20,976.
Ferroalloys	6,734	11,129	376	Japan 6,123; Canada 923; West Germany 874.
Steel, primary forms thousand tons	1,490	1,211	4	Japan 1,017; Australia 117; France 67.
Semimanufactures:				
Bars, rods, angles, shapes, sections	407,429	966,847	22,182	Japan 826,711; United Kingdom 79,757.
Universals, plates, sheets	449,257	975,726	2,204	Japan 966,393; Sweden 3,377; Canada 1,410.
Hoop and strip	73,710	78,958	6,968	Japan 64,871; West Germany 5,001.
Rails and accessories	7,644	10,570	1,625	Japan 8,095; United Kingdom 580.
Wire	31,121	35,736	1,310	Japan 30,307; Belgium 3,057.
Tubes, pipes, fittings	145,120	490,562	68,953	Japan 402,033; United Kingdom 3,722.
Castings and forgings, rough	1,036	11,608	1,772	Japan 6,800; West Germany 902; United Kingdom 726.
Lead:				
Oxides	236	179	1	Mexico 153; Japan 25.
Metal including alloys:				
Scrap	23,388	4,301	2,466	Kuwait 695; Canada 283; Japan 200.
Unwrought	20,617	40,156	1,576	Singapore 13,862; Peru 8,686; Taiwan 5,152.
Semimanufactures	150	161	21	Japan 118; West Germany 13.
Magnesium: Metal including alloys:				
Unwrought including scrap	r482	401	270	Norway 62; Japan 45.
Semimanufactures	14	4	3	Japan 1.
Manganese:				
Ore and concentrate:				
Battery-grade	3,435	3,389	--	Singapore 2,916; Japan 401.
Metallurgical-grade	204,765	278,626	--	Australia 148,017; India 90,383; Gabon 21,721.
Oxides	1,321	1,202	--	Japan 1,124; Belgium 54; Sweden 24.
Mercury ____ 76-pound flasks	836	657	51	Japan 576.
Metalloids:				
Arsenic, oxides and acids kilograms	--	309	7	Japan 302.
Phosphorus	879	1,356	417	Canada 696; Taiwan 215.
Selenium	5	5	--	Japan 4.
Silicon	603	313	35	Taiwan 141; Norway 85; Japan 18.
Molybdenum: Metal including alloys, all forms	20	7	3	Japan 3; France 1.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss	31	--		
Oxides and hydroxides	102	89	--	Canada 77; Japan 10.
Metal including alloys:				
Scrap	11	4	4	
Unwrought	2,777	3,812	638	Norway 860; Canada 717; Netherlands 350.
Semimanufactures	533	587	156	Japan 298; Canada 70; West Germany 49.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	76	1,811	5	West Germany 1,789; Japan 15.
Silver:				
Waste and sweepings value	$640,886	$37	--	All from Japan.
Metal including alloys, unwrought and partly wrought thousand troy ounces	[2]2,472	335	11	Japan 284; Singapore 24.
Tin:				
Ore and concentrate	331	151	--	Burma 72; Singapore 58; Thailand 21.
Metal including alloys:				
Unwrought including scrap	1,234	2,057	7	Malaysia 1,314; Indonesia 511; Hong Kong 114.
Semimanufactures	95	98	10	Japan 45; Thailand 30.
Titanium:				
Ore and concentrate	34,890	26,028	--	Malaysia 20,875; Australia 4,791; India 270.
Oxides	1,976	4,309	157	Japan 2,795; West Germany 1,163; Australia 149.
Metal including alloys, all forms	NA	931	729	Japan 202.
Tungsten:				
Ore and concentrate	67	--		
Metal including alloys, all forms	16	19	5	Japan 13.
Vanadium: Oxides and hydroxides	739	491	--	All from Japan.
Zinc:				
Ore and concentrate	43,760	90,323	10,889	Australia 69,461; Peru 9,973.
Oxides	226	192	77	Japan 103; West Germany 12.
Blue powder	NA	167	163	Japan 4.
Metal including alloys:				
Scrap	9,191	10,146	216	Japan 7,804; Australia 1,560.
Unwrought	1,986	2,072	--	Japan 1,637; Australia 417.
Semimanufactures	301	27	[1]	Japan 25.
Zirconium: Ore and concentrate	1,208	3,123	--	Australia 2,398; Malaysia 606; Japan 101.
Other:				
Oxides and hydroxides	165	302	3	Japan 220; Belgium 48.
Ashes and residues	28,664	46,138	14	Japan 46,095.
Base metals including alloys, all forms	610	268	35	Japan 22.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	369	628	10	Japan 360; India 258.
Artificial: Corundum	9,833	11,048	35	Japan 10,026; Austria 270; Taiwan 188; India 183.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	2	[1]	--	All from Japan.
Grinding and polishing wheels and stones	530	581	16	Japan 446.
Asbestos, crude	36,787	53,787	4,052	Canada 17,763; Australia 1,943; Japan 339.
Barite and witherite	100	200	--	All from Thailand.
Boron materials:				
Crude natural borates	941	497	--	All from Japan.
Oxides and acids	1,052	1,406	1,136	Japan 108; Italy 36; Hong Kong 34; Taiwan 34.
Cement	5,112	7,003,361	140	Japan 7,002,795.
Chalk	[3]	[4]505	--	All from Japan.
Clays and clay products:				
Crude, unspecified	54,501	97,604	45,806	Japan 40,616; Hong Kong 9,707.
Products:				
Nonrefractory	2,638	11,001	4	Japan 9,748; Italy 723; West Germany 511.
Refractory including nonclay brick	93,437	727,397	12,176	Japan 665,434; West Germany 48,808.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diamond:				
Natural:				
Gem, not set or strung value, thousands	$1,782	$1,667	--	Japan $611; Hong Kong $473; Belgium $371.
Industrial, excluding dust and powder ---do---	$830	$826	$659	Japan $133.
Dust and powder ---do---	$2,751	$412	$19	Japan $392.
Synthetic and reconstructed:				
Gem, not set or strung --do---	$5	--		
Industrial, excluding dust and powder ---do---	$11	$3	--	All from Japan.
Dust and powder ---do---	$3,019	$5,985	$3,246	Japan $2,728; United Kingdom $10.
Diatomite and other infusorial earth	49	49	49	
Feldspar, fluorspar, related materials	27,718	23,128	--	Thailand 17,462; Taiwan 5,332.
Fertilizer materials: Manufactured:				
Ammonia	18	3,762	9	Japan 3,003; Indonesia 749.
Nitrogenous	3,584	5,786	9	Japan 3,084; Chile 2,638.
Phosphatic	20	--	--	
Potassic	259,087	269,577	252	Canada 255,277; Belgium 10,366; Taiwan 3,676.
Unspecified and mixed	38	27	--	Japan 26.
Graphite, natural	322	205	17	Japan 151; India 37.
Gypsum and plaster	8,425	741	9	Japan 720; Morocco 12.
Halogens, unspecified	125	106	42	Japan 6.
Magnesium compounds:				
Magnesite	123	7,346	--	All from Japan.
Oxides and hydroxides	14,004	10,429	4	Japan 10,365; West Germany 49.
Mica:				
Crude including splittings and waste	134	122	56	Japan 42; India 13.
Worked including agglomerated splittings	33	104	(1)	Switzerland 59; Japan 43.
Phosphates, crude ---thousand tons	1,670	1,137	1,084	Nauru 52.
Pigments, mineral: Iron oxides and hydroxides, processed	1,884	1,777	66	Japan 1,486; West Germany 215.
Precious and semiprecious stones other than diamond:				
Natural[5] ---kilograms---	53,155	87,061	10,364	Japan 57,847; Brazil 12,582; Bolivia 2,000.
Synthetic ---do---	222,470	35,219	19,521	Japan 11,195; Belgium 2,568; Hong Kong 985.
Salt and brine	716,288	970,242	--	Australia 647,206; Japan 250,573; Taiwan 21,178.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	937	1,403	145	Japan 1,045; Spain 66; France 54.
Sodium carbonate, natural and manufactured	25,406	--	--	
Sodium hydroxide	56,970	11,670	500	Japan 7,911; West Germany 877; Belgium 620.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	52,479	4,151	2	India 1,236; Italy 1,091; Japan 883.
Dolomite, chiefly refractory-grade	567	30	--	All from Japan.
Gravel and crushed rock	438	145	1	France 123; Japan 18.
Limestone other than dimension	20,907	5,010	--	All from Japan.
Quartz and quartzite	96	27	1	Belgium 23.
Sand other than metal-bearing	119,474	85,969	4	Australia 84,991; West Germany 601.
Sulfur:				
Elemental:				
Crude including native and by-product	519,184	386,430	5,350	Canada 193,756; Japan 182,324.
Colloidal, precipitated, sublimed	342	322	163	Japan 147; West Germany 12.
Dioxide	7	14	2	Japan 12.
Sulfuric acid	9,766	143	76	Japan 66.
Talc, steatite, soapstone, pyrophyllite	268	1,789	53	Japan 231; West Germany 18.
Other:				
Crude	4,691	8,984	9	Japan 3,427; Australia 2,596; Taiwan 504.
Slag and dross, not metal-bearing	86,520	13,426	--	All from Japan.
Oxides and hydroxides of barium, magnesium, strontium	50	132	--	West Germany 90; Japan 39.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1,534	4,574	2,295	Japan 1,903; Norway 366.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	103	636	148	Japan 344; Hong Kong 77; United Kingdom 67.
Carbon: Carbon black and gas carbon	12,250	14,858	11,029	Canada 1,695; Japan 1,004; Australia 950.
Coal:				
Anthracite thousand tons	2,386	5,204	1,677	Japan 448; Hong Kong 208.
Bituminous do.	4,911	7,245	1,447	Australia 3,089; Canada 1,585; Austria 222.
Briquets of anthracite and bituminous coal	8	123,775	31,435	Japan 3.
Lignite including briquets	117	6,012	NA	NA.
Coke and semicoke	120,657	182,551	35,467	Japan 109,160; Taiwan 14,663; New Zealand 8,498.
Hydrogen, helium, rare gases	81	39	4	Japan 33.
Peat including briquets and litter	46	13	--	All from Canada.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	r186,710	175,964	14	Saudi Arabia 102,463; Kuwait 38,552; Indonesia 2,840.
Refinery products:				
Liquefied petroleum gas do.	734	905	(1)	Japan 334; Indonesia 281; Saudi Arabia 211.
Gasoline, motor do.	r95	80	--	Italy 31; Netherlands 28; Norway 21.
Mineral jelly and wax do.	125	92	10	Japan 77.
Kerosine and jet fuel do.	r255	72	34	Japan 36.
Distillate fuel oil do.	2	121	--	Mainly from Panama.
Lubricants do.	r18	583	37	Japan 387; Taiwan 150.
Nonlubricating oils do.	r103	95	13	Japan 81.
Residual fuel oil do.	r12,259	19,008	3,666	Norway 5,267; Indonesia 2,791; Japan 2,549.
Bitumen and other residues do.	r373	142	(1)	Mainly from Taiwan.
Petroleum coke do.	337	527	352	Canada 136; Japan 39.
Unspecified do.	r757	1,560	3	Singapore 916; Bahrain 465; Bangladesh 176.
Tars and other crude chemicals derived from coal, gas, and petroleum	r95,054	97,480	56,089	Japan 40,747.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]Includes reported 1,879,723 troy ounces of material listed as "sheets and strips of silver, partly worked" valued at U.S. $0.07 per troy ounce, with the source listed as the region where the Korean Customs Law is enforced.
[3]Unreported quantity valued at $1,000.
[4]Excludes unreported quantity valued at $3,243.
[5]Excludes unreported quantity valued at $223,026 in 1980 and $172,594 in 1981.

COMMODITY REVIEW

METALS

The Republic of Korea's capacity to produce metals is largely limited to iron and steel, the country's largest metal sector, and aluminum, copper, lead, and zinc. Except for domestic mine output of zinc, the Republic of Korea's smelters are dependent on foreign ores and concentrates. For instance, the Republic of Korea imports 100% of its refinery requirements for alumina, close to 100% for copper ores and concentrates, about 96% for iron ore, and close to 40% for zinc. The country is self-sufficient in tungsten and molybdenum, with the former largely exported.

Aluminum.—Aluminum of Korea Ltd. operates the only refinery in the country, a 17,500-ton-per-year plant at Ulsan. All of the refinery's requirement for alumina is imported from Japan. Annual domestic demand for metal is about 100,000 tons. To meet the shortfall in supply, the country imports unwrought metal, primarily from the United States, Canada, and Japan, and semimanufactures, mostly from Europe and Japan.

Copper.—Domestic mine production of copper is small, and virtually all ore is

imported as concentrates from the Philippines, Mexico, and Canada, in order of quantity. There are two copper refineries in the Republic of Korea: Korea Mining & Smelter Co. Ltd. at Changhang with an annual metal capacity of 40,000 tons and Onsan Copper Refinery Co. Ltd. at Onsan with an annual capacity of 80,000 tons. Annual domestic demand for metal is about 150,000 tons. Domestic consumers of copper import metal as scrap and unwrought metal and in the form of semimanufactures. A small amount is received as cement copper. The United States and Japan each contribute about 40% of the Republic of Korea's receipts of copper metal, with the remainder largely from Australia, Canada, Chile, and Peru.

Iron and Steel.—Virtually all of the Republic of Korea's requirements for iron ore are imported from Australia and India. Posco, a state-run enterprise, dominates the steel industry and is the only integrated steelmaking facility in the country. In 1982, Posco completed its phase IV-stage 1 expansion program increasing annual steel production capacity to 8.5 million tons from 5.5 million tons, elevating it from 19th to 12th place in size among world steel producers. Completion of phase IV-stage 2 expansion in 1983 will bring steel capacity to 9 million tons through modification and replacement of ancillary equipment rather than addition of new blast furnace capacity.

Total sales by Posco in 1981 were $2,232 billion, followed by Union Steel Manufacturing Co. Ltd., $311 million; Dong Jin Steel Co. (formerly Illsin Steel Co.), $227 million; Pusan Steel Pipe Industrial Co. Ltd., $194 million; Korea Steel Pipe Co. Ltd., $136 million; Korea Iron & Steel Works Co. Ltd., $91 million; Sam Cheok Industrial Co. Ltd., $63 million; Boo-Kook Steel & Wire Co. Ltd., $49 million; Dong Yang Iron Pipe Industrial Co. Ltd., $45 million; and Korea Cast Iron Pipe Industrial Co. Ltd., $42 million.

Supply-demand configuration for the Republic of Korea's iron and steel and related materials in 1981 was as follows, in thousand tons:

	Production	Imports	Consumption	Exports
Scrap iron	3,295	1,661	4,956	--
Iron ore	426	11,201	11,627	--
Coal	--	6,027	6,027	--
Ferroalloys	127	11	138	--
Pig iron	7,924	64	7,918	70
Steel ingot	10,753	8	10,759	2
Billet	2,227	66	2,158	135
Slab	6,755	--	6,553	202
Hot-roll coil	4,371	962	4,308	1,025

By value, 46% of total exports of steel products was to other Asian countries in 1982; 21%, to North America; 19%, to the Middle East; and the remainder to other areas.

Lead.—Mine output of lead from zinc ore in Kyungsang averages about 11,500 tons per year of contained lead. Lead metal is recovered as a byproduct by the copper smelter of Korea Mining & Smelter in Changhang, which has an annual lead production capacity of 12,000 tons. Annual lead consumption is about 50,000 tons. About 85% of the country's supply was from imports of scrap and unwrought metal. Most of the scrap was imported from the United States with small amounts originating in the Middle East. Imports of unwrought metal were from Peru, Mexico, Japan, and the United States, in order of quantity.

Tungsten.—Asia Hertel Tungsten Co. dedicated its ore-dressing plant at Ssangjon in November. The $4 million plant has the capacity to treat 500 tons of ore per day to produce annually 600 tons of tungsten concentrates. The tungsten will be used by the company's tungsten carbide tool plant in Ansong, Kyongg-do.

NONMETALS

Fertilizer Materials.—Total industry capacity to produce fertilizers in the Republic of Korea is about 3 million tons per year. The industry has been financially weakened because of the high cost of production and sluggish export demand. The Republic of Korea imports all of its fertilizer raw materials needs—phosphate rock, potash, and sulfur. The Economic Planning Board was to implement a plan effective January 1, 1983, whereby total industry output was to

be reduced by 30% to 2.17 million tons per year.

Graphite.—The Republic of Korea produces both crystalline and amorphous graphite, but 98% of the total output is the amorphous type. Crystalline graphite is mined at Kunggi Siheung Gunja and Kyunggi Pyungtaek Osung. Most of the amorphous graphite is mined in various locations at Chungju, Sangju, and Daejeon, in order of output quantity. Small mining operations at Daehung, Honsung Sambo, Shihung, and Yongwon were being phased down or closed.

MINERAL FUELS

The Republic of Korea is a poor country in terms of energy resources and is dependent on imported energy for its industrialization. About 75% of its energy consumption was imported in 1982. There are no proven reserves of petroleum, natural gas, or bituminous coal. For the past decade, domestic mine output of anthracite coal has averaged 18 million tons annually. The largest users of coal were the steel industry, residential sector, cement industry, and the power generation sector, in that order.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Korean won (W) to U.S. dollars at the rate of W700.3=US$1.00 for 1981 and W750.3=US$1.00 for 1982.

[3]The Bank of Korea. Economic Statistics Yearbook (Seoul). 1983, 403 pp.

[4]Lee, H. K. Financial Requirements for the Fifth 5-Year Plan. Korean Business Rev., Seoul, No. 63, October 1982, pp. 51-54.

[5]U.S. Department of Commerce. Business America. V. 5, No. 11, May 1982, pp. 26-27.

[6]Yonhap News Agency. Korea Annual (Seoul). 1982, 712 pp.

The Mineral Industry of Kuwait

By Peter J. Clarke[1]

Kuwait's mineral industry consisted almost entirely of the production and downstream processing of petroleum and natural gas. While 1982 marked a large-scale domestic cutback in oil production, petroleum revenues, Government budget outlays, and overall economic activity, it was also a period of significant growth in the Kuwaiti Government's plan to develop a worldwide integrated energy industry. Also, for the first time in 1982, Kuwait's investment income, estimated at $10.2 billion,[2] surpassed its revenues from oil, which were down sharply from $17.4 billion in 1981 to under $10 billion in 1982.

General oversupply conditions on the world's oil markets combined with the effects of economic recession in the industrial countries served to perpetuate the oil glut that began in 1981. The results for Kuwait were not only a 27% drop in crude oil production, but also a drastic decline in the production and export of liquefied petroleum gas (LPG) due to reduced associated gas output. The loss of this associated gas supply was one of Kuwait's most critical problems in 1982. In addition to forcing the giant gas-processing plant at Shuaiba to run at less than one-half of capacity, the gas shortage adversely affected some of the country's other basic industries, such as fertilizer production, water desalinization, and power generation, leaving them with inadequate supplies of feedstock and fuel.

The Kuwait Petroleum Corp. (KPC), owned by the Government, was the main umbrella organization that controlled all aspects of Kuwait's oil industry. Under KPC's jurisdiction were the subsidiary companies: the Kuwait Oil Co. (KOC), which produced most of Kuwait's oil and operated the Ahmadi refinery; the Kuwait National Petroleum Co. (KNPC), which operated the Mina Abdullah and Shuaiba refineries and other facilities; the Kuwait Petrochemical Industries Co. (PIC), which operated the ammonia-urea fertilizer plant at Shuaiba; the Kuwait Oil Tankers Co., which operated a fleet of crude oil and LPG tankers; the Kuwait International Petroleum Investments Co., which invests in oil-related ventures overseas; and the Kuwait Foreign Petroleum Exploration Co., which explores for and develops petroleum concessions overseas. On June 12, 1982, KPC's capital was increased from $3.5 to $8.7 billion. However, for the fiscal year 1982-83, KPC's net profits fell an estimated 85%, from $1.2 billion to $182 million. Expenditures of the corporation were also trimmed in 1982 by an estimated 30%.

Despite the slump in the oil market, Kuwait continued to forge ahead on its long-term growth plan in several areas. Domestically, Kuwait continued to explore for deep nonassociated gas to meet its LPG export targets and industrial requirements. Kuwait was also rapidly expanding its domestic refinery capacity from 410,000 to 600,000 barrels per day. However, plans to build a $1 billion olefins-aromatics petrochemical plant at Shuaiba were shelved in October 1982, because of the unfavorable market conditions.

Kuwait's emphasis on expansion of exploration, refining, and downstream processing capabilities fit into a larger overall development scheme that was being implemented around the world. Kuwait's foreign activities had a more far-reaching impact than any domestic development during the year. Kuwait's goal is to gradually develop its own overseas integrated petroleum exploration, production, refining, petrochemical

manufacturing, and marketing organization. This will not only provide an outlet for its own crude oil and refined product output, but will also diversify its sources of crude oil, provide a greater flexibility and variety of customers, and ensure a steady flow of income.

As part of the strategy, Kuwait acquired the U.S.-owned Santa Fe International Corp. in 1981 for $2.5 billion. Along with Santa Fe came its C. F. Braun and Co. engineering subsidiary. In 1982, Santa Fe, on behalf of KPC, purchased Andover Oil Co., of Tulsa, Okla., which owns acreage in the United States containing 16 million barrels of proven oil reserves. Kuwait also holds a 23% share of the International Energy Development Corp. B.V., a Netherlands-based holding company for the IEDC Group, which has a direct share in 100 million acres of oil and gas rights around the world. In September 1982, KPC purchased 24.5% of the equity of the West German petrochemical giant Hoechst AG. This follows the recent purchase in 1981 of 22% of Metallgesellschaft AG of the Federal Republic of Germany. The most recent phase of Kuwait's investment strategy was KPC's acquisition of Gulf Oil Co.'s (United States) refining and marketing facilities in Belgium, the Netherlands, and Luxembourg, which include a 75,000-barrel-per-day refinery in Rotterdam along with about 750 retail stations in the three countries. KPC was also involved in a joint venture with AZL Resources Inc., United States, to explore for oil in the United States. With these investments, KPC has become one of the largest and most flexible of the international oil companies.

PRODUCTION AND TRADE

Crude oil production was down sharply in 1982, to approximately 823,000 barrels per day, which is the lowest level since the oil industry began operating in the late 1940's. Exports of crude oil were also at an alltime low. Exports of refined products remained fairly strong during the year, averaging about 250,000 barrels per day. Owing to the low level of oil production, associated gas production was also far below previous years, and Kuwait was unable to fulfill some of its LPG supply contracts. Ammonia and urea production and exports, which also rely on associated gas, were down considerably. Production of nonfuel minerals, namely cement, clays, lime, caustic soda, and sulfur, remained at previous levels. Production of all minerals and mineral fuels is shown in table 1.

Kuwait's total exports, chiefly petroleum and refinery products, in 1982 were valued at approximately $10.1 billion, down 35% from the 1981 level. Imports, excluding gold, were valued at $7.4 billion, which still left Kuwait with a substantial balance-of-trade surplus. Exports of crude oil fluctuated during the year from under 200,000 to over 400,000 barrels per day, ending with a yearly average closer to 300,000 barrels per day. Exports were directed mainly at China, the Republic of Korea, other far eastern nations, Italy, and the United States. LPG exports were sold almost entirely to Japanese contract customers, with smaller volumes going to the United States and Turkey. The latest available trade data are shown in tables 2 and 3.

Table 1.—Kuwait: Production of mineral commodities[1]

Commodity	1978	1979	1980	1981[p]	1982[e]
Cement ---------- thousand metric tons	621	1,040	1,307	1,549	1,550
Clay products, nonrefractory: Sand-lime bricks cubic meters	262,528	357,777	338,128	293,682	295,000
Gas, natural:[2]					
Gross ---------- million cubic feet	392,838	r460,376	310,066	223,525	162,300
Marketed ---------- do	221,069	r334,371	260,039	196,352	158,000
Lime: Hydrated and quicklime --- metric tons	3,837	5,634	17,738	21,598	22,000
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	5,415	r9,875	7,472	5,463	4,000
Liquefied petroleum gas (propane and butane) do	13,853	r36,458	28,285	16,540	12,000
Total ---------- do	19,268	r46,333	35,757	22,003	16,000
Nitrogen: N content of ammonia -- metric tons	r310,195	304,556	214,456	213,330	150,000

See footnotes at end of table.

Table 1.—Kuwait: Production of mineral commodities[1] —Continued

Commodity	1978	1979	1980	1981[p]	1982[e]
Petroleum and refinery products:					
Crude[2] thousand 42-gallon barrels	777,961	912,610	608,914	411,174	300,577
Refinery products:					
Gasoline, motor do	7,458	[r]8,834	7,947	8,255	8,250
Jet fuel do	3,104	[r]6,931	4,175	5,788	5,800
Kerosine do	10,608	[r]11,979	11,110	7,451	7,450
Distillate fuel oil do	30,160	[r]30,867	27,516	23,822	23,500
Residual fuel oil do	58,334	[r]66,095	53,109	41,749	41,500
Naphtha do	18,581	[r]23,033	17,045	13,116	13,100
Asphalt do	729	963	1,181	1,526	1,500
Unspecified do	1,551	[r]1,918	1,075	749	750
Total do	[r]130,525	[r]150,620	123,158	102,456	101,850
Salt metric tons	18,973	[r]19,670	20,498	18,663	18,500
Sodium and potassium compounds: Caustic soda do	8,009	[r]9,219	9,111	14,263	14,200
Sulfur:					
Elemental, petroleum byproduct do	100,000	100,000	120,000	97,000	100,000
Sulfuric acid do	NA	NA	NA	4,759	20,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 1, 1983.
[2]Includes Kuwait's share of production in the Kuwait-Saudi Arabia Divided Zone.

Table 2.—Kuwait: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	1,054	1,699	--	Syria 877; Saudi Arabia 647; United Arab Emirates 65.
Copper: Metal including alloys, unwrought and semimanufactures	110	532	--	Iran 338; Saudi Arabia 144; Iraq 41.
Iron and steel: Metal:				
Scrap	21,460	62,200	--	Pakistan 33,914; Bangladesh 14,946; India 3,911.
Pig iron, cast iron, related materials	9,535	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections	56,435	41,377	--	Iraq 18,351; Saudi Arabia 16,358; Jordan 4,437.
Universals, plates, sheets	8,608	8,599	--	Saudi Arabia 5,014; Iran 1,422; Iraq 701.
Wire	482	431	--	Saudi Arabia 262; Iraq 87; Iran 47.
Tubes, pipes, fittings	13,249	19,173	--	Iraq 11,641; Saudi Arabia 5,094; Iran 1,268.
Lead: Metal including alloys, unwrought and semimanufactures	914	696	--	Saudi Arabia 524; Iran 100; Iraq 64.
Nickel: Metal including alloys, unwrought and semimanufactures	1	--		
Tin: Metal including alloys, unwrought and semimanufactures	2	--		
Uranium and/or thorium: Metal including alloys, all forms value, thousands	--	$5	--	All to United Kingdom.
Zinc:				
Blue powder	219	--		
Metal including alloys, semimanufactures	--	90	--	Saudi Arabia 88; Qatar 2.
Other:				
Oxides and hydroxides	16	6	--	Bahrain 5.
Pyrophoric alloys	1	1	--	Mainly to Saudi Arabia.
Base metals including alloys:				
Scrap	50,132	33,947	--	Republic of Korea 13,071; Iran 4,613; India 4,341.
Unwrought and semimanufactures	2	5	--	Mainly to Saudi Arabia.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	32	49	--	Saudi Arabia 44; Iraq 5.
Asbestos, crude	2	6	--	All to Saudi Arabia.

Table 2.—Kuwait: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Cement	60,541	278,041	--	Iraq 229,859; Saudi Arabia 48,007.
Clays and clay products:				
Crude, unspecified	3,217	13,913	--	Iraq 13,152; United Arab Emirates 311; Syria 243.
Products:				
Nonrefractory	3,790	3,528	--	Saudi Arabia 2,103; Iran 811; Iraq 375.
Refractory including nonclay brick	378	446	--	Saudi Arabia 270; United Arab Emirates 115; Iraq 61.
Fertilizer materials:				
Crude, n.e.s	142	112	--	People's Democratic Republic of Yemen 50; Saudi Arabia 39; Oman 15.
Manufactured:				
Ammonia	87,683	48,888	--	France 21,859; India 18,824; Tunisia 7,350.
Nitrogenous	563,862	391,812	--	China 119,130; Iran 93,557; Sudan 55,613.
Unspecified and mixed	129	331	--	Jordan 161; Iran 75; People's Democratic Republic of Yemen 61.
Graphite, natural	1	--		
Gypsum and plaster	6	52	--	Saudi Arabia 45; Qatar 7.
Halogens: Chlorine	1,050	124	--	Saudi Arabia 37; Oman 30; United Arab Emirates 30.
Lime	1	626	--	Iraq 373; Saudi Arabia 253.
Precious and semiprecious stones other than diamond carats	8,000	--		
Salt and brine	745	1,854	--	Iraq 1,293; Jordan 369; Saudi Arabia 165.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	15	156	--	Iraq 101; United Arab Emirates 45; Saudi Arabia 10.
Sodium hydroxide	5,526	3,874	--	Iraq 3,110; Saudi Arabia 579; United Arab Emirates 130.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	119	169	--	Iraq 100; Saudi Arabia 69.
Worked	1,494	1,812	--	Saudi Arabia 1,654; Lebanon 71; Jordan 60.
Gravel and crushed rock	1,478	1,923	--	Saudi Arabia 1,801; Lebanon 49; Iraq 43.
Sand other than metal-bearing	411	40	--	All to Iraq.
Sulfur:				
Elemental: Colloidal, precipitated, sublimed	72,530	240,380	--	Indonesia 121,459; India 95,046; Pakistan 12,760.
Sulfuric acid	1,851	1,929	--	Iraq 1,277; Syria 330; Saudi Arabia 322.
Other:				
Crude	85	4,396	--	Iraq 4,391; Saudi Arabia 5.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	15,570	12,233	--	Saudi Arabia 5,482; Iraq 5,250; Qatar 637.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets and coke	16	21	--	Qatar 18; Saudi Arabia 3.
Hydrogen, helium, rare gases	138	479	--	Iraq 299; Iran 96; United Arab Emirates 31.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	765,402	474,731	7,486	Japan 85,840; Netherlands 70,620; Republic of Korea 49,854; United Kingdom 45,476.

Table 2.—Kuwait: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	31,910	25,124	--	Japan 20,673; Turkey 2,498; France 429.
Gasoline ---do---	r9,681	1,523	--	Japan 809; Netherlands 342; People's Democratic Republic of Yemen 157.
Mineral jelly and wax ---do---	(1)	(1)	--	All to Iraq.
Kerosine and jet fuel ---do---	r12,699	28,830	--	United Arab Emirates 5,796; Indonesia 3,908; Pakistan 3,249.
Distillate fuel oil ---do---	r29,808	25,018	217	Pakistan 7,298; West Germany 3,260; Indonesia 2,996.
Lubricants ---do---	r22	21	--	Saudi Arabia 6; Iran 4; Iraq 4.
Residual fuel oil ---do---	r61,627	41,811	--	Australia 9,323; Philippines 5,481; Japan 4,144.
Naphtha ---do---	r28,340	NA		
Bitumen and other residues ---do---	6	9	--	United Arab Emirates 6; Iraq 2.
Tars and other crude chemicals derived from coal, gas, and petroleum -- thousand tons	3,213	2,595	--	Japan 1,271; Netherlands 507; Italy 246.

rRevised. NA Not available.
[1]Less than 1/2 unit.

Table 3.—Kuwait: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	11,683	16,489	795	Bahrain 5,972; France 2,173; Turkey 1,030.
Copper: Metal including alloys, unwrought and semimanufactures	1,764	3,011	472	Japan 1,179; United Kingdom 859; Republic of Korea 151.
Iron and steel: Metal:				
Scrap	2,978	1,182	NA	Saudi Arabia 841; Iraq 55.
Pig iron, cast iron, related materials	--	525	--	Canada 500; Netherlands 25.
Semimanufactures:				
Bars, rods, angles, shapes, sections	465,274	381,221	334	Japan 164,069; Republic of Korea 55,867; Qatar 55,811.
Universals, plates, sheets	104,264	141,967	665	Japan 97,949; West Germany 17,539; Republic of Korea 9,854.
Wire	9,734	17,902	87	Japan 4,376; West Germany 3,885; United Kingdom 2,641.
Tubes, pipes, fittings	145,956	102,730	3,214	France 25,659; Japan 22,762; U.S.S.R. 10,918.
Lead: Metal including alloys, unwrought and semimanufactures	2,956	2,749	292	United Kingdom 1,366; Iran 209; West Germany 184.
Nickel: Metal including alloys, unwrought and semimanufactures	1	1	--	All from France.
Tin: Metal including alloys, unwrought and semimanufactures	6	1	--	All from United Kingdom.
Uranium and/or thorium: Metal including alloys, all forms ---- value, thousands	$288	$98	$7	United Kingdom $84; West Germany $7.
Zinc:				
Blue powder	591	--		
Metal including alloys, semimanufactures	--	109	--	United Kingdom 21; China 20; France 19.
Other:				
Oxides and hydroxides	2,390	433	49	Belgium-Luxembourg 113; United Kingdom 82; Canada 64.
Pyrophoric alloys	(1)	3	--	Mainly from Lebanon.
Base metals including alloys:				
Scrap	16,766	15,204	NA	Saudi Arabia 13,594; Iraq 132.
Unwrought and semimanufactures	165	155	5	Japan 45; France 43; West Germany 23.

See footnotes at end of table.

Table 3.—Kuwait: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980: United States	Sources, 1980: Other (principal)
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	566	503	--	Italy 365; Lebanon 32; Japan 25.
Asbestos, crude	10,044	2,084	--	Republic of South Africa 1,225.
Cement ---- thousand tons	2,633	2,887	(1)	Japan 1,984; Republic of Korea 356; Spain 286.
Clays and clay products:				
Crude, unspecified	1,731	58,681	9,040	Ireland 18,145; Greece 17,854; India 10,350.
Products:				
Nonrefractory	45,709	44,270	541	Italy 15,006; Spain 13,658; West Germany 5,839.
Refractory including nonclay brick	1,288	3,894	429	India 2,481; Saudi Arabia 393; West Germany 215.
Diamond: Gem, not set or strung value, thousands	$356	$1,036	--	Belgium-Luxembourg $587; India $272; United Kingdom $157.
Fertilizer materials:				
Crude, n.e.s	2	--		
Manufactured:				
Ammonia	1	53	--	West Germany 50; Netherlands 3.
Unspecified and mixed	438	666	--	West Germany 426; Netherlands 76; Qatar 75.
Graphite, natural ---- kilograms	200	--		
Gypsum and plaster	60,453	25,380	18	Saudi Arabia 14,719; Iraq 6,224; Egypt 2,091.
Halogens: Chlorine	190	253	--	India 160; Saudi Arabia 82; West Germany 11.
Lime	31,880	22,112	41	Spain 14,699; United Arab Emirates 4,207; Lebanon 2,705.
Precious and semiprecious stones other than diamond ---- value, thousands	$241	$1,325	--	India $506; Hong Kong $279; Italy $206.
Salt and brine	5,701	37,134	488	Yemen Arab Republic 20,996; Jordan 6,394; Saudi Arabia 2,762.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	318	--		
Sodium hydroxide	439	52	--	India 22; United Kingdom 4.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	55.564	203,260	--	Saudi Arabia 194,948; Jordan 2,622; Lebanon 2,500.
Worked	108,897	131,292	--	Italy 68,626; Jordan 45,966; Greece 6,505.
Gravel and crushed rock	906,197	174,907	(1)	Iran 80,922; Italy 61,408; Syria 13,528.
Sand other than metal-bearing	399	1,501	13	Japan 710; Jordan 296; Syria 275.
Sulfur: Sulfuric acid	(1)	17	13	Denmark 3.
Other:				
Crude	r2,576	6,023	1	Jordan 2,457; Netherlands 512; Italy 478.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1,411	1,263	76	India 484; Yugoslavia 314; Iraq 133.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets and coke	1,242	--		
Hydrogen, helium, rare gases	497	950	212	Netherlands 515; France 113; United Kingdom 64.
Petroleum refinery products:				
Gasoline ---- 42-gallon barrels	--	83,572	--	Bahrain 83,402; Italy 170.
Mineral jelly and wax ---- do	--	102	63	United Kingdom 24; Netherlands 15.
Kerosine and jet fuel ---- do	1,008	8,587	--	India 5,812; West Germany 2,015; United Kingdom 411.
Lubricants ---- do	299,507	237,377	39,599	Singapore 70,203; Netherlands 32,123; United Kingdom 27,244.
Residual fuel oil ---- do	--	263,723	--	All from Oman.
Bitumen and other residues ---- do	4,124	2,594	236	Italy 1,145; Netherlands 545; France 418.
Bituminous mixtures ---- do	9,849	23,428	327	India 18,180; United Kingdom 1,291; Japan 921.

rRevised. NA Not available.
1Less than 1/2 unit.

COMMODITY REVIEW

METALS

Kuwait did not produce any raw metals in 1982, nor were there any known metalliferous deposits in Kuwait. Construction of an aluminum smelter, which had been proposed in 1980 and 1981, was shelved because of the poor aluminum market and the presence of two already operating smelters in Bahrain and Dubai. In Kuwait, the Arab Light Metal Industries Co. produced about 3,000 tons of aluminum manufactured goods from imported aluminum, and the Kuwait Metal Pipe Industry operated a 100,000-ton-per-year spiral-weld pipe mill, which produced pipeline for the oil industry. Kuwait's foreign holdings in the metals industry included a 22% share of Metallgesellschaft, a 30% share of Korf Stahl AG of the Federal Republic of Germany and its U.S. associate Korf Industries, a 28% equity share of Spain's Prereducidos del Suroeste de España S.A. (Presura) direct-reduction iron plant, and shares in the Arab Iron and Steel Co.'s planned 4-million-ton-per-year iron pelletizing plant in Bahrain. Kuwait was also considering a project to extract uranium from phosphate ore in Tunisia.

NONMETALS

Cement.—The Kuwait Cement Co. produced cement from imported gypsum and clinker at a rate of 600,000 to 700,000 tons per year, which fell far short of domestic demand, estimated at 3 million tons annually. Development work continued on the construction of the Saudi-Kuwait Cement Manufacturing Co., to be located in Khursaniyah, Saudi Arabia. The joint project was to produce 2.5 million tons of clinker for the production of portland cement. The plant was being built by Krupp Polysius AG of the Federal Republic of Germany under a $325 million contract. The plant's output was expected to meet the future demands of both Saudi Arabia, which owned 55% of the project, and Kuwait, which owned the other 45%.

Fertilizer Materials.—PIC was the sole producer of ammonia and urea from its petrochemical complex at Shuaiba. PIC's facilities at Shuaiba include three parallel ammonia production trains, each capable of producing 220,000 tons per year of ammonia; three urea plants, with a total capacity of 792,000 tons per year; an ammonium sulfate plant, with a capacity of 165,000 tons per year; and a sulfuric acid plant, which could produce 132,000 tons per year. Another ammonia line was under construction by C. F. Braun in 1982, which would raise total capacity to 1 million tons per year and provide an exportable surplus of nearly 300,000 tons per year of ammonia. Currently all ammonia production is consumed in the production of prilled urea, all of which is bagged at the plant and exported, mainly to China, the Middle East, and Africa. Despite the planned capacity increases, production of ammonia and urea declined about 30% in 1982, owing to the shortage of associated gas feedstock and stiff competition from fertilizer produced in the Far East. With lower oil production ceilings for most of the Organization of Petroleum Exporting Countries (OPEC) and no current supply of nonassociated gas, feedstock supplies for the ammonia-urea fertilizer plant will be limited for the next few years, which may result in the fourth ammonia line remaining inoperative.

A second fertilizer plant was being planned in Kuwait, as a joint venture of the Tunisian state-owned Maghrabia Chemical Industries Co. and PIC. The plant would produce 330,000 tons per year of diammonium phosphate from Kuwait's ammonia and Tunisia's phosphate. PIC already owns a 49% share of the Tunisian Gabes Fertilizer Co., located in Tunisia.

Salt.—PIC operated a salt and chlorine plant that produced caustic soda, chlorine, hydrochloric acid, hydrogen, sodium hypochlorite, and distilled water. The plant utilized seawater from the Arabian Gulf and associated natural gas from Kuwait's crude oil production. PIC was planning a second chlorine plant at Shuaiba that would produce 70 tons per day of chlorine.

MINERAL FUELS

Natural Gas.—Currently, all of Kuwait's gas output is produced in association with crude oil, which meant that gas supplies in 1982 were at an alltime low, down 30% from that of 1981. This drop left the major gas-consuming industries, the Shuaiba LPG plant, the ammonia-urea fertilizer plant, and water desalinization plants without adequate feedstock supplies.

KPC has embarked on an expensive deep gas exploration drilling program, which

they hope will encounter large quantities of nonassociated gas to take up the slack in current production. Results from the drilling program have not been encouraging thus far.

Kuwait's major gas project, the giant LPG plant at Shuaiba, operated at about 40% of capacity for most of 1982, owing to the gas shortage. The plant, operated by KOC, is capable of producing 3.5 million tons per year of LPG, composed of 60% propane and 40% butane. The plant was designed to treat all of the associated gas output from an annual crude oil production of over 1 million barrels per day. With recent production at one-half that level, the plant has never operated above 60% capacity, and in 1982, only one of three parallel production trains was operating. The gas shortage became so acute that in April, KPC notified some of its Japanese customers that f.o.b. contracts for LPG sales were being temporarily suspended for reasons of force majeure.

To alleviate the shortage, KOC was beginning development work on the Southern Gas Project, a gas gathering network designed to collect and transport associated gas production from the Divided Zone, where gas is presently being flared. With the Divided Zone production as low as it was in 1982, however, the cost of building the system began to outweigh the marginal benefits of the increased gas supplies. Several issues also were left unresolved between Kuwait and Saudi Arabia over jurisdiction in the Divided Zone, which made preliminary work more difficult.

Petroleum.—*Production.*—Total production of crude oil in Kuwait fell in response to weak demand to its lowest level in over 30 years in 1982, to an average of 823,000 barrels per day. In March 1982, OPEC producers agreed on an overall production ceiling of 17.5 million barrels per day, of which Kuwait's ceiling was 800,000 barrels per day. The ceiling had little effect, however, because total OPEC production averaged well below the ceiling for much of the year. All of Kuwait's crude oil was sold on a contract basis at the official OPEC price.

Kuwait's oil production is derived mainly from onshore fields in Kuwait proper, where production during the year fluctuated from 600,000 to 800,000 barrels per day, and also from their share of the Kuwait-Saudi Arabian Divided Zone. Kuwait's share of the Divided Zone production ranged from 70,000 to 200,000 barrels per day. All of mainland Kuwait's onshore oil is produced by KOC. Production in the Divided Zone is from both onshore and offshore fields. The Arabian Oil Co., owned 40% by Kuwait and 60% by Saudi Arabia, operates the offshore wells, the production of which is split evenly. Onshore production facilities are operated by KOC on behalf of Kuwait, and Getty Oil Co. on behalf of itself and Saudi Arabia. Getty's concession in the Divided Zone was granted by Saudi Arabia in 1954, but a more recent agreement has put the concession in Kuwait territory. Complicating matters further, KOC has charged that in the late 1950's, Getty overlifted above its entitlement, and KOC is now pressuring for repayment in current value barrels of oil. Late in the year, Getty filed suit against KOC for overlifting above the agreed upon levels. The situation remained stalemated at the end of the year.

Exploration.—Exploration in Kuwait was limited mainly to deep gas exploration wells under the Burghan Field, in the offshore areas, and in the Fars heavy oil formation. One interesting development was the discovery of sweet light crude in northern Kuwait, encountered while drilling for nonassociated gas. The strike of 35.7° API crude in the Marat Formation at 3,550 meters depth, may allow Kuwait to offer light crude on the international market in addition to its traditional heavier, higher sulfur crude oil.

Kuwait's overseas exploration program was expanding rapidly in 1982. In 1981, Kuwait established the Kuwait Foreign Petroleum Exploration Co. (KUFPEC) to undertake oil-related ventures overseas. Since then, KUFPEC has spent well over $100 million in acquiring exploration leases on nearly every continent in the world.

Refining.—Kuwait's domestic expansion objectives are mainly to increase downstream processing of crude oil and offer more refined products and less crude oil for export. In 1982, there were three operating petroleum refineries in Kuwait, the most modern being the 180,000-barrel-per-day (crude throughput) refinery at Shuaiba, which is operated by KNPC. Shuaiba was shut down for a short while in May of 1982 because of a fire in the gas-cooling unit. Expansion of KOC's Ahmadi refinery was underway in 1982. Capacity was to be expanded from 110,000 to 250,000 barrels per day. Expansion plans for the Mina Abdullah refinery were postponed late in 1982 after KPC's purchase of Gulf's Europe-

an refinery facilities. The plan was originally to expand capacity from 120,000 to 300,000 barrels per day, and the contract had already been awarded to KPC's subsidiary, C. F. Braun. Whether the expansion would go through in the future was left unclear at yearend.

Kuwait's production and exports of refined products fell slightly in 1982, continuing the declining trend established in 1979. Of Kuwait's total current rated capacity of 410,000 barrels per day, about 30,000 to 50,000 barrels per day are consumed domestically, leaving the balance for export. Actual refinery production averaged about 280,000 barrels per day in 1982. With all of the planned refinery capacity onstream, Kuwait should be able to process 60% to 70% of its crude oil production domestically and still have a crude surplus to supply its foreign refineries.

Petrochemicals.—Kuwait's plans to develop its own domestic petrochemical industry were postponed in 1982, and it appeared as though it would not be revived in the future. PIC had planned, until late in the year, to build an olefins-aromatics complex at Shuaiba. The complex was to utilize ethane gas from the LPG plant to produce 350,000 tons per year of ethylene, 135,000 tons per year of ethylene glycol, 165,000 tons per year of low-density polyethylene, 340,000 tons per year of styrene, 280,000 tons per year of benzol, 60,000 tons per year of orthoxylene, and 90,000 tons per year of paraxylene. C. F. Braun had already been awarded a $1.3 billion contract for engineering and construction of the plant when KPC decided to shelve the project. This left PIC with only a fertilizer and salt and chemicals division.

Overseas, KPC purchased a 25% equity share in Hoechst, a major petrochemical supplier to Europe. PIC also has foreign holdings that include a 40% interest in the Mediterranean Fertilizer Industries Co. in Turkey, a 50% share in the Bahrain-Kuwait Petrochemical Industries Co., which will produce ammonia and methanol from tail gases of Bahrain's LPG project, and the joint share in the Tunisian fertilizer plant.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Kuwaiti dinars (KD) to U.S. dollars at the rate of KD0.288=US$1.00.

The Mineral Industry of Liberia

By Ben A. Kornhauser[1]

The mineral industry continued to be the main support of Liberia's economy, sustained by the production of iron ore, diamonds, and gold. Preliminary 1982 data indicated that the gross domestic product had fallen sharply. Current account balances and budget problems were alleviated substantially by assistance from the International Monetary Fund, the United States, and other donors and an increase in maritime revenues. However, since mid-1982, foreign exchange requirements of the Liberian Government exceeded its capacity to repay financial commitments, causing sharp cutbacks in expenditures, and stopping contributions to its development budget.

In 1982, Liberia remained as Africa's largest producer of iron ore although revenues therefrom declined. The worldwide recession of the steel industry seriously affected the country's three iron ore operations and created financial problems that could reduce their future viability. Gold mining decreased in both production and value compared with that of 1981. However, concessions to prospect for gold were still granted.

Liberia borrowed extensively to pay for its oil imports during fiscal year 1982. In that period, the United States allocated $35 million in economic support funds to Liberia, mostly for oil purchases.

PRODUCTION AND TRADE

Preliminary indications for 1982 were that Liberia would have a balance-of-trade deficit. Exports declined significantly after a respectable first-quarter performance. In fiscal year 1981-82, the majority of the country's trade, both imports and exports, were with developed countries. The largest suppliers were the United States, 27%, and the Federal Republic of Germany, 13%. The purchasers of Liberian exports were the Federal Republic of Germany, 28%; Italy, 15%; the United States, 14%; and France, 12%.

Iron ore continued as Liberia's major export and accounted for more than one-half of its 1982 exports. However, receipts for iron ore were lower in 1982 owing to depressed world economies that caused lower Liberian exports of 16,370,000 metric tons. The drop in oil price was expected to improve the competitiveness of Liberian iron ore because the price of oil is a significant factor in the cost of iron ore production, particularly that of the Bong Mining Co. (BMC). Other major exports were rubber and diamonds.

In 1982, Liberia exported gold valued at $3.75 million and diamonds valued at $26.28 million. Diamonds increased 29% in production and 12% in value over that of 1981 although the value of a carat decreased an average of $9.

Table 1.—Liberia: Production of mineral commodities

Commodity[1]	1978	1979	1980	1981[p]	1982[e]
Cement, hydraulic thousand metric tons	132	145	140	150	80
Diamond:					
Gem[e] thousand carats	128	170	123	132	170
Industrial do.	180	132	175	204	263
Total do.	308	302	298	336	433
Gold[e] troy ounces	NA	1,086	7,243	16,720	2,981
Iron ore thousand metric tons	17,989	18,345	17,900	19,704	18,165
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	112	541	500	500	
Jet fuel do.	45	252	250	250	
Kerosine do.	24	68	60	60	
Distillate fuel oil do.	166	800	1,000	1,000	NA
Residual fuel oil do.	317	1,842	1,800	1,800	
Other do.	18	44	40	40	
Refinery fuel and losses do.	71	261	250	250	
Total do.	753	3,808	3,900	3,900	NA

[e]Estimated. [p]Preliminary. NA Not available.
[1]In addition to the commodities listed, a variety of crude construction materials (clays, stone, and sand and gravel) were produced, but available information is inadequate to make reliable estimates of output levels.

Table 2.—Liberia: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	1	--		
Semimanufactures	--	3	--	All to Sierra Leone.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	7,243	[1]16,864	7,752	Switzerland 5,480; West Germany 890.
Iron and steel:				
Iron ore and concentrate thousand tons	17,199	20,694	3,052	West Germany 6,768; Italy 3,584; Belgium-Luxembourg 1,419.
Metal:				
Scrap	--	12	--	All to Belgium-Luxembourg.
Semimanufactures	3	--		
Silver: Metal including alloys, unwrought and partly wrought troy ounces	--	280	--	All to West Germany.
Zinc: Metal including alloys, semimanufactures kilograms	--	87	--	All to Guinea.
Other: Metals including alloys, scrap	6,262	10,815	--	Italy 7,010; Yugoslavia 1,500; Netherlands 1,028.
NONMETALS				
Cement	990	315	--	Guinea 158; Sierra Leone 157.
Clays and clay products: Products, refractory including nonclay brick	--	1	--	All to Sierra Leone.
Diamond: Industrial carats	298,446	336,019	30,616	Belgium-Luxembourg 152,364; United Kingdom 149,143.
Fertilizer materials: Manufactured, nitrogenous	153	--		
Salt and brine	1	5	--	All to Guinea.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	1	--	All to Sierra Leone.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Gasoline 42-gallon barrels	155	101	--	All to Guinea.
Kerosine and jet fuel do.	85	1,162	--	Sierra Leone 931; Guinea 231.
Distillate fuel oil do.	136	2,661	108	Guinea 2,553.
Lubricants do.	10	208	--	Guinea 206; Ghana 2.
Residual fuel oil do.	45,865	19	--	All to Guinea.
Bituminous mixtures do.	46,420	--		

[1]Annual Report for the period Jan. 1, 1982, to Dec. 31, 1982, Ministry of Lands, Mines and Energy, Republic of Liberia.

Table 3.—Liberia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, unwrought and semimanufactures	487	362	113	Switzerland 145; Sweden 70.
Copper: Metal including alloys, semimanufactures	61	24	12	West Germany 3; United Kingdom 3.
Iron and steel: Metal:				
Scrap	2	751	170	Sweden 581.
Pig iron, ferroalloys, similar materials	322	1,407	1,393	Sweden 8; France 6.
Steel, primary forms	391	205	40	Japan 135; United Kingdom 8; Sweden 7.
Semimanufactures:				
Bars, rods, angles, shapes, sections	4,318	1,130	125	West Germany 378; Belgium-Luxembourg 279; Japan 75.
Universals, plates, sheets	4,584	2,909	474	Japan 1,253; Belgium-Luxembourg 585; West Germany 350.
Hoop and strip	12	54	13	United Kingdom 29; Republic of Korea 6.
Rails and accessories	1,579	6,022	4,980	Belgium-Luxembourg 861; West Germany 171.
Wire	162	43	3	Belgium-Luxembourg 24; Greece 12.
Tubes, pipes, fittings	1,787	3,194	2,316	West Germany 315; China 172.
Castings and forgings, rough	5	20	6	United Kingdom 12; Sweden 2.
Lead: Metal including alloys, unwrought and semimanufactures	70	66	10	Belgium-Luxembourg 27; Japan 13; West Germany 13.
Nickel: Metal including alloys, unwrought and semimanufactures	1	2	(1)	Mainly from France.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	75	--		
Silver: Metal including alloys, unwrought and partly wrought do.	4	(1)	--	All from Sweden.
Tin: Metal including alloys, unwrought and semimanufactures	20	70	45	France 12; West Germany 11.
Uranium and/or thorium: Metals:				
Uranium depleted in U-235	1	--		
Zinc: Metal including alloys, unwrought and semimanufactures	973	163	--	Japan 85; Belgium-Luxembourg 46; China 17.
Other:				
Oxides and hydroxides	274	283	37	West Germany 195; United Kingdom 44.
Metals including alloys, unwrought and semimanufactures value	--	$5,602	--	Netherlands $5,337; Sweden $265.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc do.	--	$6,069	--	All from Italy.
Grinding and polishing wheels and stones do.	$40,213	$41,072	$816	West Germany $8,422; France $6,096; Japan $5,632.
Asbestos, crude	52	--		
Cement	98,834	100,494	12	Norway 59,644; France 39,387; West Germany 1,335.
Clays and clay products:				
Crude, unspecified	24,460	13,080	671	United Kingdom 1,161; West Germany 800.
Products:				
Nonrefractory[2]	540	349	23	Czechoslovakia 190; West Germany 75.
Refractory including nonclay brick	159	110	31	West Germany 73; Netherlands 2.
Fertilizer materials:				
Crude, unspecified	228	--		
Manufactured:				
Ammonia	3,342	1,425	1,134	United Kingdom 278.
Nitrogenous	9,326	12,922	1	Norway 8,492; West Germany 3,386; Sweden 993.
Phosphatic	1,162	--		
Potassic	202	139	1	West Germany 128; Sweden 5.
Unspecified and mixed	1,346	1,372	1,104	Belgium-Luxembourg 255; Sierra Leone 12.
Graphite, natural kilograms	165	--		
Gypsum and plaster	1,073	--		
Lime	145,055	315,806	5	Netherlands 163,900; United Kingdom 139,465; West Germany 12,366.

See footnotes at end of table.

Table 3.—Liberia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Mica: Worked including agglomerated splittings value	--	$141	$141	
Nitrates, crude	307	770	(1)	Mainly from United Kingdom.
Phosphates, crude	632	57	--	Mainly from West Germany.
Potassium salts, crude	6	617	--	All from United Kingdom.
Precious and semiprecious stones:				
Synthetic value	$3,429	$80	--	All from Nigeria.
Salt and brine	3,138	5,180	1,119	West Germany 3,473; United Kingdom 273.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	--	127	47	Sweden 61; Belgium-Luxembourg 11.
Sodium hydroxide	935	784	319	United Kingdom 245; West Germany 182; China 10.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	38	--	Italy 29; Belgium-Luxembourg 9.
Worked	7	16	3	Italy 8; Sweden 4.
Gravel and crushed rock	5,186	3,080	29	Italy 3,051.
Limestone other than dimension	25,868	2,002	405	Belgium-Luxembourg 880; United Kingdom 670; West Germany 41.
Other:				
Crude	15	13	2	Belgium-Luxembourg 11.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals[3]	3,092	1,218	56	Morocco 751; France 203.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	10	1	--	All from Sweden.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	4,325	2,832	--	Saudi Arabia 2,538; Netherlands 293.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	855	[4]1,605	1,593	United Kingdom 7; China 5.
Gasoline do	[r]7,270	90,687	3,135	Netherlands 29,951; Canada 17,335; Ivory Coast 17,096.
Mineral jelly and wax do	1,096	7,667	905	Italy 3,901; West Germany 2,744.
Kerosine and jet fuel do	270	29,403	9	Canada 16,034; Netherlands 7,922; Ivory Coast 4,761.
Distillate fuel oil do	1,646	262,180	--	Canada 155,817; Belgium-Luxembourg 67,665.
Lubricants do	56,163	70,031	20,905	United Kingdom 20,702; Netherlands 14,632.
Nonlubricating oils do	1,014	715	84	United Kingdom 353; Netherlands 268.
Residual fuel oil do	34	3	--	All from Sierra Leone.
Bitumen and other residues do	223	1	1	
Bituminous mixtures do	21,948	363	190	United Kingdom 96; Brazil 59.
Tars and other crude chemicals derived from coal, gas, and petroleum	37	--		

[r]Revised.
[1]Less than 1/2 unit.
[2]Totals exclude unreported quantities valued at $6,498 in 1980 and $8,374 in 1981.
[3]Totals exclude unreported quantities valued at $273,115 in 1980 and $11,921 in 1981.
[4]Excludes unreported quantity valued at $6,350.

COMMODITY REVIEW

METALS

Gold.—Much of Liberia's gold exports were believed to have come from gold smuggled into the country attracted by the local U.S. dollar currency. In 1981, gold exports reached 16,864 troy ounces; however, gold exports dropped in 1982 to 12,656 troy ounces because of price fluctuations on the world market. During 1982, the Bentley International Trading Co. completed its exploration program and expanded its pilot placer operations to include five excavators, eight small dump trucks, and a 2,600-cubic-meter-per-day washing plant. Feasibility studies on developing a hard rock, open pit mining operation were not promising. Other gold mining and exploration were focused in eastern Liberia along the Lofa River.

Iron Ore.—All of the country's operating companies were severely affected by weak iron ore markets. The LAMCO Joint Venture Operating Co. (LJV), the largest iron ore mining company, cut production around midyear to 9.5 million tons; reduced its work force, salaries, and fringe benefits; and instituted a 4-day-production workweek with salaries and wages based on a 48-hour week and no overtime. The inability of the Delta Steel Co. of Nigeria to take delivery on its 1982 contract for 600,000 tons contributed to LJV's problems. In all, its exports in 1982 totaled 7,719,000 tons.[2]

BMC and the Government arrived at an agreement permitting BMC to defer royalty payments and to waive the tax on petroleum products used until BMC's cash flow became positive. BMC exports in 1982 totaled 7,662,000 tons, of which 68% was shipped to Rohstoffhandel GmbH of the Federal Republic of Germany and 32% to Finsider International S.S. (Italsider) of Italy.[3]

Although BMC is owned 50% by the Government, 33.75% by Exploration and Berghau GmbH of the Federal Republic of Germany, and 16.25% by Italsider, BMC operated as a captive mine for the minority shareholders.

A $68 million rehabilitation loan, sponsored by the International Bank for Reconstruction and Development (World Bank) for the National Iron Ore Co. Ltd. (NIOC), was expected to increase production to 3 to 3.5 million metric tons annually from its present capacity of 1.3 million tons. The program involved improvement of operational facilities, particularly the washing plant and its transport infrastructure. The loan participants were the World Bank, the African Development Bank, the Netherlands Finance Co. for Developing Countries, the Organization of Petroleum Exporting Countries Fund, and a consortium of commercial banks. However, on October 6, 1982, a tailings dam burst at its Mano River Mine in Grand Cape Mount County releasing a surge of mud, tailings, water, and debris that engulfed a camp of 1,500 mine workers and their families. Torrential rains caused a hillside to collapse into the rain-swollen tailings dam above the camp as the result of many factors including the removal of vegetative covering by farming. More than 47 persons were reported killed.

NIOC started production in 1957, and in 1981 exported 1.2 million tons of iron ore containing 55% to 59% iron, all produced at the Mano River Mine. As a consequence of this disaster and the downturn in the world's economy, NIOC exported only 771,000 tons in 1982.[4] NIOC was owned 50% by the Government and 50% by private investors.

In 1982, engineering and management contracts were signed between the Mifergui-Nimba Co. of Guinea and the United States Steel Corp. under which United States Steel acquired about 5% of the project for engineering during construction and for management during the first operating years. In a 1976 agreement between Mifergui-Nimba and LJV, LJV agreed to transport the Mifergui ore by rail from the Liberian-Guinea border to the Liberian port of Buchanan for shipment. The consortium involved in the Mifergui project consisted of 11 countries, including Liberia and Nigeria, and United States Steel. The project was expected to produce 15 million tons per year of 66.5% high-grade iron ore.[5]

The Liberian Mining Co. was granted a concession in October 1982 to exploit the Bea Mountain deposits of about 800 million dry tons of indicated reserves. These reserves consisted of 60 million tons of weathered and semiweathered ores and 735 million tons of unweathered magnetite. The company expected initially to mine 4 million tons of weathered and semiweathered ore annually. Because of the worldwide depression in the iron and steel industry, the Liberian Iron and Steel Corp. (LISCO) concession to develop the Wologisi iron ore was extended by the Government through November 1984 with certain conditions including the acquisition of 51% of LISCO by a group of Japanese steel companies led by Kawasaki Steel Corp.

NONMETALS

Cement.—In September 1982, the Liberia Cement Co. (CEMENCO) disclosed production of only 4,000 bags per day, down from 40,000 bags per day. Management stated that delivery of cement to many sections of the country had slowed because of bad road conditions. CEMENCO also believed that production had been affected by large imports of cement by some concessions and agencies. In that period, the Minister of Commerce, Industry, and Transportation began arranging for the import of cement by a local distributor at a price of $1.50 per bag less than locally produced material.[6]

Diamond.—Some of Liberia's diamond exports, as in the case of gold, was believed to come from Guinea and Sierra Leone. Diamond exploration concentrated on allu-

vial sand and gravel deposits with major production coming from the Saniquellie and Bahn districts in the Lofa River Valley. Liberia licensed a large number of small-scale alluvial diamond (gold) prospectors and miners but did not track production from each working. Licensed brokers traveled around the country purchasing diamonds from sellers who either found them locally or brought them in from adjacent counties to sell them for U.S. dollars. The brokers then registered all diamonds exported and paid the Government a 3% royalty. Diamond exports in 1982 increased to $26.4 million—433,000 carats at $61 per carat, while exports in 1981 equaled $23.5 million—336,000 carats at $70 per carat.

MINERAL FUELS

Petroleum.—The Ministry of Lands, Mines and Energy conducted seminars in March and April 1982 to disclose technical data on its available blocks and to discuss the legal, fiscal, and contractual requirements of an exploration venture in Liberia.[7] On March 31, 1982, the Government released a model contract and revised petroleum legislation. The legislation provided for a production-sharing agreement that permitted accelerated recovery of oil company expenditures, followed by an escalation of the Government's share based on increases in the pretax rate of return. The exploration period was for 3 years with two 2-year extensions possible. The production period was established at 25 years. The signature bonus was set at $100,000 and royalties at 12.5%. Production sharing would range up to 80% Government and 20% company on a pretax rate of return above 50%. Income tax was set at 50%.[8]

Uranium.—The Ministry of Lands, Mines and Energy considered the St. John River zone to be too significant a mineralized area to grant sole exploration rights to any company. The Coastal Liberian Uranium Enterprises Inc. of Houston, Tex., which had explored for uranium in Liberia since 1977, relinquished its exploration area and terminated its agreement with the Government in November 1982.[9]

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[1]Physical scientist, Division of Foreign Data.
[2]Skillings' Mining Review. V. 72, No. 9, Feb. 26, 1983, p. 17.
[3]———. V. 72, No. 10, Mar. 5, 1983, p. 21.
[4]Page 8 of work cited in footnote 3.
[5]Engineering and Mining Journal. August 1982, pp. 37, 41.
[6]Daily Observer (Monrovia, Liberia). Sept. 9, 1982, pp. 1, 10.
[7]Oil and Gas Journal. V. 80, No. 14, Apr. 5, 1982, p. 118.
[8]———. V. 80, No. 15, Apr. 12, 1982, p. 167.
[9]Daily Observer (Monrovia, Liberia). June 2, 1982, pp. 1, 10.

The Mineral Industry of Libya

By John R. Lewis[1]

Financed almost completely by oil export revenues, on the order of $22 billion in 1980-81, Libya was undergoing rapid economic and social development at the beginning of the 1980's. Under the country's 1981-85 $55 to $60 billion development plan, expenditures were to amount to about $11 to $12 billion annually, leaving substantial budget surpluses.[2] As the 1980's began, Libya's gross national product (GNP) was $26 billion, and about two-thirds of the revenue came from oil exports. The year 1982 witnessed continued international economic recession and a severe deterioration in Libya's crude oil market. This was characterized by continued fall in demand and pressure on prices leading to reductions in sales and prices as set by the Organization of Petroleum Exporting Countries (OPEC). Furthermore, the contribution to GNP of exported oil dropped to about 50%, or about $10 to $12 billion in 1982, and many facets of Libya's plans for continued rapid development were cut back while others were temporarily suspended. Minerals other than crude petroleum were produced in small volumes and contributed little or nothing to the balance-of-payments situation.

On March 12, 1982, the President of the United States directed that a ban be imposed on the import of Libyan crude oil into the United States. Just prior to this embargo, U.S. imports of Libyan crude were down to about 120,000 barrels daily, which amounted to about 2% of U.S. daily oil imports and less than 1% of U.S. daily oil consumption. The five U.S. oil companies operating in Libya, Occidental Petroleum Corp., Continental Oil Co., Marathon Oil Co., Amerada-Hess Corp., and Mobil Oil Corp., were not prohibited from operating there as long as they did not ship oil produced in Libya to the United States. The President's order also stated that it would be general policy to deny export licenses for the shipment to Libya of oil and gas technology and equipment of U.S. origin that are not readily available from sources outside the United States.

On June 9, 1982, Mobil gave notice to the Libyan Government that its Libyan affiliate, Mobil Oil Libya, would cease its somewhat limited operations on July 13, 1982. Mobil had operated in Libya since 1955. According to reports, Mobil held a 34% interest in a joint exploration and production venture in which the Libyan Government held 51%. A West German firm held the remaining 15%. At the time of the announcement, Mobil's liftings of Libyan crude were 16,000 barrels daily, down from 30,000 barrels daily in 1980. Negotiations continued throughout the second half of 1982. At yearend 1982, however, an announcement by Mobil stated that the company was withdrawing from exploration and producing activities in response to various actions by the Libyan Government that effectively destroyed the economic value of Mobil's concession agreements in Libya. Mobil had instituted arbitration proceedings to recover damages and compensation.

Government Policies and Programs.—Libya's Second Transformation Plan, which began in 1981 and was to run through 1985, was a victim of the adverse conditions that beset world oil markets in 1982. The Second Plan was based on projected oil revenues of $22 billion per year, coming from sales of about 2 million barrels of oil daily. Production was off by more than one-half the anticipated amount during the first quarter of 1982, but later recovered for an average

of 1.2 million barrels daily for the entire year. Libya's General People's Congress therefore approved expenditures related to the Development Plan that were 5.1% lower than those for 1981. It appeared that the 1983 budget would be even lower.

During the year, Libya made a number of arrangements with other African countries to supply them with needed crude oil. Some of these were in the nature of emergency relief gestures, such as two shipments totaling 500,000 barrels to Ghana early in 1982. These particular shipments were part of an economic agreement between Libya and Ghana under which Libya was to provide 2,730,000 barrels, about 60% of Ghana's annual requirements, during the second half of 1982. The price, $35.28 per barrel, was slightly below the market price for Libyan and Nigerian crude ($36). An arrangement under which Libya was to supply Ghana with all its crude requirements for 15 years was also under negotiation. It was reported that this oil would be delivered to Ghana free of transportation charges.

Another cooperative agreement was made with Mozambique in March 1982 under which Libyan crude would be delivered to Mozambique. Additional details were not available. In still another arrangement, Poland was to get more than 7 million barrels of Libyan crude under a special credit extension.

Turkish firms working in Libya had over $8 billion in contracts from the Libyan Government. Under a plan worked out during the year, Libya was to supply Turkey with 40,000 barrels of crude oil per day. To wipe out about $30 million overdue to Cypriot exporters, Libya agreed to furnish Cyprus with sufficient oil to pay off the debt. This would be about 860,000 barrels, enough to cover Cyprus' imported crude requirements for about 2 months.

PRODUCTION AND TRADE

The production and export of petroleum and its associated products continued to generate almost all of Libya's foreign exchange. In 1980, exports totaled $22.5 billion while imports were $10 billion. In 1981, owing to oil price reductions, exports and imports were about equal at $15.5 billion, but in 1982, export earnings fell to $12 billion, which left a trade surplus of about $275 million. Between reduced oil prices and lower demand for Libyan oil, the country's trade balance was expected to dwindle still further in 1982.

Extensive iron ore reserves await completion of the Misratah iron and steel complex. Construction materials, including cement, gypsum, lime, potash, and salt, were available domestically in varying quantities. Most were only consumed locally. Small amounts of cement were exported.

Crude petroleum production averaged 1.2 million barrels daily in 1982 compared with 1.8 million barrels in 1980. In response to world oversupply and reduced prices, Libyan crude oil production dropped off in February and March 1982 to 600,000 barrels daily. The situation then improved under a slow and modest rise in demand, and by December 1982 production stood at 1.8 million barrels daily, the highest it had been in more than 18 months. The yearly average for 1982, 1.2 million barrels daily, was better than the 1981 average of 1.1 million barrels but still well below that necessary to fund Libya's ambitious Second Transformation Plan.

The daily output at yearend, when production was 1.8 million barrels daily, follows:[3]

Producing company	Barrels
Oasis Oil Co. (Continental Oil Co., Marathon Oil Co., and Amerada-Hess Corp.) in partnership with the Libya National Oil Co. (NOC)	695,000
Umm al Jawabi-Ageco (NOC for crudes from the Amna and Sarir Fields)	485,000
Occidental Petroleum Corp.-NOC	210,000
Azienda Generali Italiana Petroli S.p.A. (AGIP)-NOC	175,000
Sirte Oil Co. (NOC, formerly Esso Sirte Oil Co.)	135,000
Mobil Oil Corp.-NOC	85,000
Other	15,000

Table 1.—Libya: Production of mineral commodities[1]

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Cement, hydraulic[e] thousand metric tons	3,200	3,200	3,200	3,200	4,000
Gas, natural:					
Gross million cubic feet	749,913	828,491	719,414	432,000	425,000
Marketed[3] do	180,771	239,510	182,501	108,000	115,000
Gypsum thousand metric tons	180	181	180	180	175
Iron and steel: Crude steel[e] metric tons	10,000	10,000	10,000	10,000	10,000
Lime thousand metric tons	220	225	230	235	225
Nitrogen: N content of ammonia[e] metric tons	80,000	133,000	150,000	150,000	[4]244,100
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	723,613	763,471	669,780	407,705	438,000
Refinery products:					
Naphtha do	--	--	3,905	3,833	4,000
Gasoline do	3,431	5,110	4,450	3,250	4,000
Kerosine and jet fuel do	11,534	5,840	3,835	4,100	5,000
Distillate fuel oil do	10,731	13,505	9,415	7,350	8,000
Residual fuel oil do	15,658	18,615	15,805	13,475	12,500
Other do	292	365	300	475	500
Refinery fuel and losses do	4,161	1,825	800	750	1,000
Total do	45,807	45,260	38,510	33,233	35,000
Salt[e] thousand metric tons	15	10	10	10	10
Sulfur, byproduct of petroleum and natural gas[e] metric tons	19,000	[r]15,000	[r]12,000	[r]11,000	12,000

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through June 10, 1983.

[2]In addition to the commodities listed, a variety of construction materials (sand and gravel, crushed stone, brick, and tile) is produced, but available information is inadequate to make reliable estimates of output levels. Natural gas liquids are also produced but are blended with crude petroleum and are reported as part of that total.

[3]Excludes gas reinjected into reservoirs.

[4]Reported figure.

Table 2.—Libya: Exports of crude petroleum, by country

(Thousand 42-gallon barrels)

Country	1980	1981
Austria	4,326	3,412
Bahamas	30,745	3,703
Belgium-Luxembourg	1,421	--
Brazil	5,268	8,155
Bulgaria	2,664	6,053
Canada	453	2,546
Cyprus	154	551
France	17,163	14,299
German Democratic Republic	885	3,543
Germany, Federal Republic of	77,856	40,398
Ghana	847	--
Greece	20,481	20,082
Italy	116,098	94,555
Japan	8,541	8,213
Netherlands	10,717	10,645
Netherlands Antilles	898	--
Poland	2,625	--
Romania	12,051	7,914
Singapore	511	NA
Spain	30,726	26,128
Sweden	7,576	--
Switzerland	5,331	3,249
Syria	2,153	623
Turkey	19,912	20,644
United Kingdom	1,035	1,918
United States	220,416	108,019
Yemen Arab Republic	--	1,958
Yemen, People's Democratic Republic of	3,279	--
Yugoslavia	7,665	7,513
Other Asia, n.e.s	11,110	1,158
Total	622,907	395,279

NA Not available.

Table 3.—Libya: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	212	731	--	All from West Germany.
Semimanufactures	11,046	5,315	749	Italy 2,523; Greece 919; Switzerland 360.
Copper: Metal including alloys:				
Unwrought	514	1,251	--	Greece 1,186; Italy 50; Romania 15.
Semimanufactures	2,360	5,681	19	United Kingdom 2,429; Poland 1,278; Belgium-Luxembourg 872.
Iron and steel:				
Iron ore and concentrate	3,412	--		
Metal:				
Pig iron, cast iron, related materials	8,672	18,933	--	West Germany 18,842; Italy 90.
Steel, primary forms	16,778	20,386	27	Italy 9,093; West Germany 6,662; Turkey 3,000.
Semimanufactures:				
Bars, rods, angles, shapes, sections	43,041	99,172	806	Italy 53,937; Turkey 18,498; Belgium-Luxembourg 7,835.
Universals, plates, sheets	53,498	63,077	79	Italy 32,764; Belgium-Luxembourg 6,430; West Germany 5,993.
Hoop and strip	6,487	10,290	38	Italy 8,314; France 893; Spain 499.
Rails and accessories	39	155	15	West Germany 52; Poland 35; Hungary 29.
Wire	335,114	242,912	7	Italy 167,263; Czechoslovakia 16,356; Spain 15,448.
Tubes, pipes, fittings	227,996	148,163	5,393	West Germany 41,096; Italy 39,521; Japan 33,325.
Castings and forgings, rough	115	619	3	Spain 399; Italy 105; United Kingdom 90.
Lead: Metal including alloys:				
Unwrought	725	679	--	Italy 625; Romania 54.
Semimanufactures	585	1,314	(1)	Italy 1,108; West Germany 153; Romania 33.
Nickel: Metal including alloys, semimanufactures value, thousands	$36	$1	--	All from West Germany.
Silver: Metal including alloys, unwrought and partly wrought do	$2,569	$362	--	Switzerland $340; Italy $22.
Tin: Metal including alloys:				
Unwrought	10	19	--	Italy 15; Romania 4.
Semimanufactures	252	23	--	West Germany 21; Romania 2.
Uranium and/or thorium: Ore and concentrate value, thousands	$470	--		
Zinc: Metal including alloys:				
Unwrought	7	2	--	All from Romania.
Semimanufactures	1,615	4,738	--	Italy 3,985; Greece 400; West Germany 315.
Other:				
Ores and concentrates	3,820	(1)	--	All from Spain.
Base metals including alloys:				
Scrap	80	29	--	All from West Germany.
Unwrought and semimanufactures	8	22	--	Italy 18; United Kingdom 4.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,560	14	--	All from Italy.
Grinding and polishing wheels and stones	655	668	2	Italy 298; West Germany 249; Sweden 21.
Asbestos, crude	307	2,109	--	Italy 2,107; Romania 2.
Barite and witherite	--	160	--	All from Italy.
Boron materials: Crude natural borates	--	1	--	All from Romania.
Cement	631,669	558,302	--	Greece 112,563; Italy 102,909; Turkey 97,193.
Chalk	120	106	--	France 84; West Germany 9; Romania 6.
Clays and clay products:				
Crude, unspecified	30,212	25,484	3,500	United Kingdom 2,970; Italy 2,249; Turkey 1,900.
Products:				
Nonrefractory	145,354	147,503	194	Italy 109,786; Spain 11,839; Greece 5,046.
Refractory including nonclay brick	3,996	8,917	3	West Germany 2,941; Italy 872; France 815.

See footnotes at end of table.

Table 3.—Libya: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	11,489	14,607	--	Belgium-Luxembourg 6,600; Greece 4,200; Romania 3,800.
Manufactured:				
Nitrogenous	26,016	78	--	All from Romania.
Phosphatic	32,727	8,058	625	Netherlands 6,783; Belgium-Luxembourg 485.
Potassic	38,814	8,860	--	Belgium-Luxembourg 6,800; Greece 2,060.
Unspecified and mixed	3,932	10,730	3,500	Yugoslavia 6,500; Romania 360.
Gypsum and plaster	332	1,737	7	Turkey 800; Yugoslavia 420; Italy 402.
Lime	5,370	6,438	--	Italy 3,375; Romania 755.
Magnesium compounds: Magnesite	--	1	--	All from West Germany.
Mica: Worked including agglomerated splittings	--	93	--	Greece 86; Switzerland 4; Italy 3.
Pigments, mineral: Natural, crude	5,627	2,083	--	Greece 1,048: Netherlands 500; Italy 342.
Precious and semiprecious stones other than diamond: Natural: Meerschaum, amber, jet	--	1,677	--	All from Bulgaria.
Salt and brine	5,842	5	--	All from United Kingdom.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	15,002	14,084	--	Italy 10,110; Greece 2,269; Turkey 1,487.
Worked	33,997	29,108	--	Italy 16,751; Greece 6,351; Turkey 4,329.
Gravel and crushed rock	55,289	26,322	--	Italy 15,855; Greece 6,357; Turkey 2,320.
Limestone other than dimension	1,923	79	--	All from Greece.
Sand other than metal-bearing	1,098	327	70	Italy 194; United Kingdom 62.
Sulfur: Elemental, crude including native and byproduct	36	102	--	All from Italy.
Talc, steatite, soapstone, pyrophyllite	823	5,554	--	Greece 4,540; Norway 400; France 300.
Other:				
Crude	--	1,539	--	Italy 1,471; West Germany 48; Malta 20.
Slag and dross, not metal-bearing	(2)	60	--	Greece 50; Romania 10.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	65,986	37,905	37	Italy 18,435; Turkey 6,425; Yugoslavia 3,168.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	30,404	25,572	--	Spain 20,628; Italy 2,126; Japan 1,660.
Coal: All grades including briquets and coke	89	209	21	Italy 95; Turkey 50; Greece 30.
Petroleum and refinery products:				
Liquefied petroleum gas value, thousands	$417	$1,409	--	Sweden $653; Italy $539; West Germany $149.
Gasoline 42-gallon barrels	--	11,654	--	All from Italy.
Mineral jelly and wax do	1,023	28,631	79	Italy 28,497; West Germany 55.
Kerosine and jet fuel do	13,950	9,804	--	All from Italy.
Distillate fuel oil do	3,051	20,679	--	Italy 20,663; France 16.
Lubricants do	16,912	180,544	1,526	Italy 90,104; Netherlands 65,296; United Kingdom 17,234.
Residual fuel oil do	53	166	120	France 40.
Bitumen and other residues thousand 42-gallon barrels	1,189	1,149	NA	Spain 970; Italy 52; France 40.
Tars and other crude chemicals derived from coal, gas, and petroleum	479	70	6	Austria 34; Switzerland 21.

NA Not available.
[1]Less than 1/2 unit.
[2]Unreported quantity valued at $20,000.

COMMODITY REVIEW

METALS

Aluminum.—The Libyan Secretariat of Heavy Industries and the Yugoslavian firm Energoinvest agreed to set up a jointly owned company to operate the aluminum complex soon to be built at Zuwarah, west of Tripoli. The new company, Libal, was capitalized at $80 million, of which $16 million was contributed by Yugoslavia. Estimates of the cost for the complex had risen to $1.25 billion since 1981 from the original $1 billion, but projected output of aluminum had risen from 110,000 to 120,000 tons annually to 125,000 tons annually. Several West German firms, including Klöckner-Humboldt-Deutz, were among those invited to bid on the project, and Libya was understood to be discussing a financing arrangement with a large United Kingdom bank. There were indications in the summer of 1982 that contracts for work on certain parts of the aluminum project may have been suspended as an austerity measure.

Iron and Steel.—Construction was delayed on phase 1 of the Misratah iron and steel complex, 225 kilometers east of Tripoli on the Mediterranean coast, originally targeted for completion in 1985. When completed, the integrated complex is to produce steel rods, bars, and flat products required by the domestic markets, with later potential export sales aimed at various Southern European and Middle Eastern countries. Iron ore is to be imported initially, but eventually the iron requirements are to come by rail from mines to be developed at Wadi Shati in southwestern Libya.

Work on some ancillary facilities appeared to be moving ahead. Two training schools for future Misratah steelworkers were contracted early in the year. Britain's Ingersoll Engineering Projects, Austria's Voest-Alpine AG, and Italy's Techint were to be involved in a $150 million contract to build the schools at Tripoli and at Misratah. Each is designed to handle 1,000 trainees. Housing for 2,000 and associated facilities for the steelworks' construction workers were to be built during 1982 by the Lamy Co. of Verviers, Belgium, under a $12.5 million subcontract from the Federal Republic of Germany's Friedrich Krupp GmbH, leader of the consortium supplying the steel production facility.

Owing to the austerity program, work was suspended on both the 900-kilometer rail line from the Wadi Shati iron ore deposit to Misratah and the new ore-handling seaport at Misratah.

NONMETALS

Cement.—The new, 1-million-ton-per-year cement plant at Zliten, 160 kilometers east of Tripoli on the Mediterranean, was nearing completion by Kawasaki Heavy Industries Ltd. of Japan. It was to be turned over to the Libyan owners, the Secretariat of Heavy Industries, when fully operational, about mid-1983.

Dernacement's 1-million-ton-per-year cement plant at Derna, east of Benghazi, under construction by Mitsubishi Heavy Industries Co. Ltd., also of Japan, was scheduled for completion in 1982. Owing to problems with a subcontractor, the plant was not expected to produce cement before mid-1983.

MINERAL FUELS

Natural Gas.—Collection and utilization of natural gas, which was formerly flared, was proceeding as rapidly as industrial and agricultural fertilizer project developments would permit. Additional gas was being injected back into producing reservoirs. Natural gas use comprised about 19% of total domestic energy consumption in Libya in 1982, and was expected by the Government to reach 23% by 1985.

Petroleum.—*Exploration.*—On August 9, 1982, two Canadian firms eliminated themselves from further participation some months after they acquired a 10% working interest in exploration and development rights in certain Libyan onshore and offshore acreage blocks held by the French company Société National Elf-Aquitaine. Sceptre Resources Ltd. and Scarboro Resources Ltd., both of Calgary, Alberta, gave as their reason for withdrawing, their decision to restrict their activities to areas offering prospects of near-term cash flow.

In March 1982, the International Court of Justice at The Hague, Netherlands, issued a decision in settlement of the dispute between Libya and Tunisia over an offshore demarcation line on the Continental Shelf between the two nations. The boundary line indicated by the court decision starts in territorial waters 12 miles off the coastal border city of Ras Adjir and runs approximately 26° east of north to the latitude of the most westerly point of the Gulf of Gabés, 34° 10'30" north. At that point the line veers to the east at a bearing of 52°. The decision was said to allow each country an approximately equal share of the offshore territory. Still in dispute were the outer

limits of each nation's share of the shelf because of claims by Malta, whose territorial waters adjoin those of both Libya and Tunisia. Malta and Libya agreed later in the year to refer their demarcation problems to the International Court of Justice.

Following the Court's decision, U.S. and French companies began exploratory drilling in adjudicated areas offshore Libya. Exxon Corp. was using a semisubmersible rig, the *Scarabeo III,* to drill the A-1 well on Block NC87, and Elf-Aquitaine moved the *SEDCO H* semisubmersible rig on a location for a one-hole test.

In November 1982, a long-term economic, scientific, and technical agreement was signed by Libya with Yugoslavia. The document covered joint oil exploration in Libya, Libyan oil to be exported to Yugoslavia, establishment of a joint investment company, and a system for making payments.

Production.—From a first quarter's average daily production of 661,540 barrels, Libya's crude oil output rose steadily throughout 1982 to 845,900 barrels in the second quarter, 1,313,200 barrels in the third quarter, and 1,753,000 barrels in the fourth quarter; average for the year was 1,140,220 barrels daily. As 1982 began, OPEC, including Libya, was operating on a base price for the marker crude (Arabian light, 34° API) of $34 per barrel. Libya's slightly higher gravity crude was listed at $35.15 per barrel. By late in the year, however, spot prices were down to about $29 per barrel, and Libya's production was up. In early 1983, OPEC set the selling price at $29 per barrel and established production quotas, which were not closely observed. Even at December's average production of 1,800,000 barrels daily, Libya's productive capacity was not reached. The country's capability to produce crude was about 1,900,000 barrels daily at yearend 1982, with active plans by the Government to raise it to 2,100,000 barrels daily during 1983, which would be about the same productive capacity Libya possessed in 1979. Libya remained OPEC's sixth most prolific producer.

Refining.—Construction of the Ras Lanuf refining and petrochemical complexes continued throughout 1982 with completion scheduled for March 1983. Crude oil throughput capacity will be 220,000 barrels daily at the outset. Italy's Snamprogetti was the prime contractor. Libya's domestic demand for all petroleum products is expected to double between 1980 and 1985, but with the addition of petroleum products from the Ras Lanuf refinery, the country will still have some products for export, particularly fuel oil, kerosine, liquefied petroleum gas, and possibly naphtha.

Libya's second asphalt plant was under construction at Benghazi. Demand for asphalt for road and airstrip construction in Libya was 1,354,000 barrels in 1979 and is expected to be about 3,400,000 barrels per year by 1985. The Benghazi plant would supplement output of the plant at Al-Zawiya, which is reported at about 600,000 barrels per year. No data were available on the output of the new plant at Benghazi.

Transportation.—Libya's state-owned Brega Oil Marketing Co. dedicated a new petroleum wharf near Tobruk in April 1982. The thoroughly modern facility features a special sprinkler system, radio telephone communication throughout the wharf area, "ship to shore" special tanker guidance equipment, and a backup dumping station. Tankers of up to 25,000 tons of capacity can be fully loaded at the wharf, and tankers of up to 35,000 tons of capacity can be partially loaded. Tankers of these sizes are used to deliver petroleum products to customers along coasts, on deep water estuaries, and via large river systems. Site storage of diesel fuel, kerosine, and benzene was being tripled, making low-cost delivery of these products possible to countries all around the Mediterranean.

Petrochemicals.—Expansion and product diversification continued during 1982 at the Ras Lanuf petrochemical complex. The complex is operated in conjunction with the new 220,000-barrel-per-day oil refinery under construction by the Libyan Government's Azzawiya Oil Refining Co. The Ras Lanuf petrochemical complex receives its ethylene feedstocks from the oil refinery. This feedstock material will also be the key to a wide range of other petrochemical product-making plants in the area. Among these are units to make low- and high-density polyethylenes, diethylene glycol, polypropylene, and synthetic rubber. In addition, a 47,000-ton-per-year monoethylene glycol unit was under construction. All of the above units were scheduled for completion in 1984. Meanwhile, production of urea at the Marsa Brega fertilizer plant of the National Petrochemical Co. continued to increase. Based upon figures for the first half of 1982, close to 245,000 tons were produced during the full year, necessitating

use of three work shifts per day for the first time.

In 1981, it had been reported that construction of a second urea plant that would more than double the existing urea production capacity was underway at Marsa Brega, as was a 1,000-ton-per-day methanol plant addition. It is probable that these plants were among those upon which work had to be suspended in 1982 because of the Government's austerity program.

As construction continued at the partially completed Abu Kamash chemical complex, an analysis of future needs for trained personnel indicated requirements for certain special skills. Accordingly, the Government's General Co. for Chemical Industries engaged the White Young Engineering organization of Great Britain to develop a process simulator that could be used to train workers who will be needed at the complex. The Federal Republic of Germany's Klöckner-Humboldt-Deutz operates the complex. Latest 1982 figures indicate that the complex has annual capacities for 50,000 metric tons of plastics, 49,000 tons of caustic soda, 40,000 tons of table salt, 8,100 tons of sodium hypochlorite solution, 8,000 tons of hydrochloric acid, and 6,000 tons of chlorine. Ultimate cost to complete this project is now expected to be $1.2 billion. Included within the complex will be an adjacent housing estate, school, market, post office, and mosque.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Libyan dinars (LD) to U.S. dollars at the rate of LD0.30=US$1.00.

[3]Middle East Economic Survey (Nicosia, Cyprus). V. 26, No. 9, Dec. 13, 1982, p. A6.

The Mineral Industry of Madagascar

By Kevin Connor[1]

Mineral production and exports were approximately the same as in 1981, with some volume improvement in chromite ore sales. Of significance was an increase in the market price for graphite. These factors resulted in an approximate increase of 15% in mineral trade receipts for the year. In 1982, the Government initiated new foreign exchange regulations allowing exporters to automatically retain a portion of their foreign exchange receipts for capital improvements and equipment part purchases. This was expected to improve output in the mineral industry, which had been suffering for some time from equipment breakdowns and general deterioration. Two of the four petroleum companies that negotiated contracts to search for oil within Madagascar domain during 1981 and early 1982 began seismic and aeromagnetic survey operations. Exploration activities were centering on two basins, Majunga and Morondava, located just onshore and offshore of the island's central west coastal area. During the first half of the year, the Andekaleka hydroelectric dam project was completed and commissioned, with two turbines in-place capable of generating 29 megawatts each. The electrical power generated was to service the Antananarivo and Tamatave areas.

PRODUCTION AND TRADE

Of the three major minerals commercially exploited, the quantities of chromite, graphite, and mica produced were down slightly from those of 1981. Ornamental stone production remained virtually unchanged at 300 tons for the year. Exports from Madagascar's mineral sector made up less than 5% of Madagascar's total export revenue. Of those minerals that were exported, graphite accounted for 45% of the mineral trade receipts, chromite ore, 36%; mica, 11%; and ornamental stones made up the remaining 8%.

For the third consecutive year, exports of chromite ore to the United States increased, reaching 41,000 tons total in 1982. This made the United States Madagascar's biggest export market for chromite ore for the year and represented 8% of U.S. imports of that mineral commodity. Exports of Madagascar's high-grade graphite to the United States were slightly over 2,200 tons and represented 15% of Madagascar's export market for graphite. Although Madagascar exported almost 1,300 tons of mica in 1982, less than 1% was traded to the United States. Mineral export revenues from U.S. trade totaled approximately $4 million,[2] which was 26% of Madagascar's total mineral export receipts for the year.

Table 1.—Madagascar: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Beryllium: Beryl concentrate, industrial grade, gross weight[e]	[3]11	10	10	10	10
Chromium: Chromite concentrate, gross weight	137,552	128,347	180,000	99,689	[3]98,863
Gold, mine output, metal content—troy ounces	125	125	114	[e]110	110
Nickel, mine output, metal content	NA	NA	100	NA	NA
NONMETALS					
Abrasives, natural: Garnet (industrial only)[e] kilograms	[3]10,500	5,000	5,000	5,000	5,000
Cement, hydraulic	66,044	70,000	60,050	[e]65,000	65,000
Clays: Kaolin	2,596	1,899	2,858	1,746	1,750
Feldspar—kilograms	1,000	[3]1,830	[e]1,800	[e]1,800	1,800
Gem and ornamental stones:					
Agate—do.	98,400	7,514	14,381	45,822	45,800
Amazonite—do.	2,800	1,459	1,300	711	700
Amethyst:					
Gem—do.	26	31	10	24	25
Geodes—do.	NA	2,393	3,400	350	350
Apatite (ornamental only)—do.	491	175	200	29	30
Aragonite	770	1,120	969	1,166	1,200
Beryl—kilograms	1	5	--	--	--
Calcite (ornamental only)	--	2	--	--	--
Celestine—kilograms	29,532	24,846	22,758	24,882	25,000
Citrine, gem—do.	NA	7	8	33	30
Cordierite—do.	(4)	158	154	348	350
Garnet:					
Gem—do.	9	5	1,666	--	--
Other ornamental—do.	616	1,251			
Jasper—do.	1,030	2,930	2,305	2,850	2,850
Labradorite—do.	7,504	7,500	24,806	3,084	3,100
Quartz:					
Rose quartz—do.	64,800	39,683	84,460	58,842	58,850
Geodes—do.	--	950	57	60	60
Other ornamental—do.	3,515	1,299	21,649	3,527	3,500
Rhodonite—do.	--	11,990	350	--	--
Tourmaline:					
Gem—do.	1,563	734	1,745	--	1,750
Other ornamental—do.	1,915	1,134			
Graphite, all grades	16,625	14,242	12,252	[r e]16,000	[3]15,354
Mica, phlogopite:					
Block	NA	61	84	334	330
Splittings and sheet	1,566	1,106	1,647	--	--
Scrap	NA	NA	NA	49	50
Total	NA	NA	NA	383	380
Quartz, piezoelectric—kilograms	200	52	167	73	75
Salt, marine[e]	[3]30,000	30,000	30,000	30,000	30,000
Stone:					
Calcite, industrial	303	1,973	[e]2,000	[e]2,000	2,000
Marble, cipoline	2,136	4,017	470	[e]500	500
Other: Bastnasite—kilograms	NA	22,313	[e]23,000	[e]23,000	23,000
MINERAL FUELS AND RELATED MATERIALS					
Petroleum refinery products:					
Gasoline—thousand 42-gallon barrels	796	478	[e]500	544	550
Kerosine and jet fuel—do.	365	275	[e]300	335	330
Distillate fuel oil—do.	761	502	[e]500	747	750
Residual fuel oil—do.	1,123	1,151	[e]1,200	935	930
Other—do.	87	44	[e]50	37	40
Refinery fuel and losses—do.	428	[e]335	[e]350	--	--
Total—do.	3,560	2,785	[e]2,900	2,598	2,600

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through May 4, 1983.

[2]In addition to the commodities listed, opal and modest quantities of unlisted varieties of crude construction materials (clays, stone, and sand and gravel) presumably are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Chromite.—Kraomita Malagasy, Madagascar's chromite ore mining and processing agency, finished with construction and testing of its new mill facilities at Andriamena. The mill, which was designed by the French agency, Société General de Recherches et d'Exploitation Minières, produces a chromite ore concentrate with a lower phosphorus content than previously constructed milling facilities. Prior to commissioning of the new mill, Kraomita had consistently produced a lumpy ore with a phosphorus content of 10 parts per thousand by weight, which was unacceptably high for ferrochrome production. Over 20% of Madagascar's processed chromite ore production in 1982 was of low-phosphorus lumpy grade, and this figure was expected to increase in coming years. The low-phosphorus lumpy-grade chromite ore is more marketable and of higher value because of its suitability for ferrochrome production. The new processing mill had a capacity to produce 150,000 tons per year of 40- to 150-millimeter size ore averaging 44% Cr_2O_3 with a chrome to iron ratio of 2.5 to 1.

Iron Ore.—Investigations continued concerning the Soalala iron ore deposit. The research efforts were being conducted by the Bureau de Récherches Géologiques et Minières of France and entailed 2,500 meters of drilling and coring and ore beneficiation tests. The deposits are only 40 kilometers from Madagascar's west coast, near the Bay of Baly. However, there were no port facilities at the Bay of Baly, and the nearest ocean load-out facilities were at the Port of Majunga, 150 kilometers northeast of Soalala. A preliminary study by Italsider S.p.A. of Italy, completed in 1981, estimated ore reserves at 300 million tons with a 48% iron content.

NONMETALS

Graphite.—Madagascar remained the world's leading producer of high-grade crystalline flake graphite. Quality flake and lump graphite were produced by five companies that operated in a 50-kilometer-wide strip about 75 kilometers inland from the eastern coast running from the town of Vatomandry north to approximately the same latitude as the Port of Tamatave. The two major producers in 1982 were Etablissements Gallois, with 50% of the country's total production, and Société Minière de la Grand Ile (SMGI), which accounted for 30% of the total or slightly over 4,600 tons. Late in 1982, SMGI acquired the Sahanavo graphite mine, which had closed in 1978. SMGI officials planned to reopen and operate the mine in 1983 and projected a 20% increase in annual production for the company. SMGI also acquired new Caterpillar mining equipment to facilitate its expansion plans. For the second year in a row, graphite export receipts exceeded chromite sales, making it Madagascar's leading mineral export commodity, accounting for one-half of Madagascar's mineral export trade.

MINERAL FUELS

Heavy Oil.—In November, the International Bank for Reconstruction and Development (World Bank) approved an $11.5 million credit for a second-phase project to further define the commercial development potential of Madagascar's heavy oil deposits at Tsimiroro. The project as outlined would be a 10-well exploratory drilling program to determine deposit characteristics and reserve potential. The previous initial phase, conducted in 1980-81, resulted in estimates of almost 5 billion barrels of heavy oil reserves in place at Tsimiroro. Also envisioned as part of the second-phase project work was an engineering design study for a pilot production plant to optimize heavy oil production techniques. An estimated 12 Malagasian technicians were to be trained overseas in petroleum production technology as part of the second-phase effort. The Organization of Petroleum Exporting Countries had pledged to provide an additional $5 million for the project, which was expected to get underway by mid-spring of 1983.

Petroleum.—In July 1982, the fourth petroleum company to negotiate an exploration agreement with the Government of Madagascar in the 1980's, U.S. AMOCO, signed a contract covering an 8-year maximum period and a minimum of four exploration wells. Subsequent to the signing of the AMOCO contract, a total of three U.S. petroleum companies and one Italian firm, Azienda Generali Italiana Petroli S.p.A. (AGIP), were engaged in partnership agreements with the Government of Madagascar to explore for petroleum. The other two U.S. petroleum companies, the Occidental Petroleum Corp. and Mobil Oil Corp., were engaged in field survey work by early spring of 1982, with Occidental prospecting on land around the Toliara area using aeromagnetic surveys and Mobil investigat-

ing offshore Morondava using seismic techniques from a specially equipped boat. AMOCO's awarded concession was 5.6 million acres in the Bermaraha area of northwest Morondava Basin, just north of the Occidental concession and slightly larger in area. Mobil was also exploring in the Morondava Basin. AGIP was granted a concession northeast of Morondava in the Majunga Basin.

Petroleum Refinery.—Madagascar's sole petroleum refinery at Tamatave, operated by the Madagascar Petroleum Co., produced refined petroleum products at approximately the same level of crude throughput as in 1981. The plant produced 2.6 million barrels of fuel products, of which about 65% was fuel oil, 20% was gasoline, 11% was kerosine, and 4% was butane. The percentage of butane produced from the imported crude was down by almost 50% from production in 1981 and caused a countrywide shortage of bottled fuel gas for the last half of the year. The $30 million modernization and expansion work on the Tamatave refinery that started in late 1980 was nearing completion at the end of 1982.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Madagascar francs (FMG) to U.S. dollars at the rate of FMG375=US$1.00 in 1982.

The Mineral Industry of Malaysia

By John C. Wu[1]

Despite the adverse environment of the world economy, the mineral industry of Malaysia managed to expand by about 4%. The growth in the mining sector was contributed principally by the increases in the output of crude oil. During 1981-82, the value added by the mining sector to Malaysia's gross domestic product (GDP) was about 4%.

According to the Malaysia Ministry of Finance, the growth in real GDP was estimated at 3.9% in 1982 compared with 6.9% in 1981. The weakened domestic demand and reduced foreign demand for the Malaysian exports resulted in slower growth in the Malaysian economy. The Malaysia GDP in millions of 1970 constant Malaysian dollars, by sector of origin for 1981-82, is given in the following table:[2]

Table 1.—Malaysia: Gross domestic product, by sector of origin

(Millions of 1970 constant Malaysian dollars unless otherwise specified)

Sector of origin	1981	Growth rate (percent)	1982[e]	Growth rate (percent)
Agriculture	6,586	5.3	6,711	1.9
Mining	1,131	-3.4	1,175	3.9
Manufacturing	5,069	4.0	5,246	3.5
Construction	1,318	9.0	1,410	7.0
Government services	3,689	15.2	3,817	3.5
Other sectors	10,245	11.3	10,772	5.1
Total GDP	28,038	6.9	29,131	3.9

[e]Estimated.

Source: Malaysia Ministry of Finance.

Malaysia's gross national product was estimated at $12.74 billion compared with $12.28 billion in 1981.[3] Inflation in Malaysia was estimated at about 5% in 1982 compared with 9% in 1981. The total labor force grew from 5.6 million in 1981 to 5.7 million, of which about 5% was unemployed.

Malaysia remained the world's largest tin producer. The output of tin dropped sharply in 1982 as a result of high production costs, low tin prices, and mounting inventory owing to the falling demand for tin on the world markets. The small gravel pump miners were the hardest hit by the overall cutback in tin production. The Government of Malaysia planned to cut tin output by 20% or 15,000 tons per year starting in 1983. However, the development of the Kuala Langat tin deposit in Selangor will not be affected by the future cutback in overall tin production.

In an effort to assist the tin miners to overcome their financial difficulties, the Government of Malaysia revised the threshold price to M$26.40 per kilogram from M$23.15 per kilogram to lower the burden of export duty that the industry was paying in 1982.

During the year several attempts were made by Malaysia, Thailand, Indonesia, and other tin producing countries to form a tin producers association. However, because of differences in arrangements on export controls, buffer stockpilings, and voting rights, the formation of the association did not materialize in 1982.

The plans to build a $152 million copper smelter in Kota Belud of Sabah was dropped by the state Government in 1982. However, the construction work on a 650,000-ton-per-year direct-reduction iron plant on Labuan Island of Sabah and another 600,000-ton-per-year direct-reduction iron plant at Telok Kalong of Terengganu were started.

The construction work on a new cement plant was started in Pulau Langkawi. Kedah Cement Sdn. Bhd., the owner and operator of the 1.2-million-ton-per-year cement plant under construction, planned to expand the capacity to 2.4 million tons.

A $250 million contract for an ammonia-urea project was awarded by the Association of Southeast Asian Nations (ASEAN) Bintulu Fertilizer Sdn. Bhd. to Kobe Steel Ltd. of Japan in midyear. The complex was scheduled to come onstream in mid-1985.

In the mineral fuel sector, the construction work for the first-stage production of the Bintulu liquefied natural gas (LNG) plant was completed at Tanjung Kidurong. The total estimated costs of the Bintulu project including a deep water port, a gas pipeline, and a fleet of five tankers was about $3.1 billion.

For the first time in the history of Malaysia's merchandise trade, a trade deficit of about $320 million was recorded.

PRODUCTION

The mineral industry of Malaysia was dominated by the mineral fuel sector. The increase in petroleum production contributed mostly to the growth in the entire mining sector. Despite the oil glut on the world markets, the output of crude oil rose to an average of 297,000 barrels per day. The upward trend was mainly due to change in the enforcement of the National Petroleum Depletion Policy.

The output of bauxite, iron ore, tin, and other metals, such as columbite, ilmenite, monazite, xenotime, and zircon decreased in 1982. Falling demand, rising production costs, the depletion of higher ore grades, and heavy taxation were cited by the industry sources as the main causes for the decline. The output of antimony and copper remained at about the same level as that of 1981. However, gold and tungsten production increased slightly.

Production of cement and other nonmetallic minerals such as kaolin, limestone, crushed rock, and granite continued its upward trend because of the increased construction activities in various parts of the country.

Table 2.—Malaysia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum: Bauxite, gross weight thousand tons	615	387	920	701	600
Antimony, mine output, metal content (Sarawak)	263	307	131	191	120
Columbium and tantalum concentrate, gross weight	23	40	33	23	10
Copper, mine output, metal content (Sabah)	r25,872	r24,514	27,013	28,642	30,000
Gold, mine output, metal content:					
Malaya troy ounces	6,252	5,493	4,621	5,691	6,000
Sabah do	64,377	55,292	60,905	69,915	70,000
Sarawak do	971	1,063	379	82	100
Total do	r71,600	r61,848	65,905	75,688	76,100
Iron and steel:					
Iron ore and concentrate thousand tons	320	350	371	532	380
Crude steel do	203	r207	210	210	210
Manganese ore and concentrate, gross weight	42,721	31,605	4,003	--	--
Rare-earth metals: Monazite, gross weight[3]	r1,254	r542	347	320	500
Silver, mine output, metal content (Sabah) thousand troy ounces	459	r432	437	472	470
Tin:					
Mine output, metal content	62,650	62,995	61,404	59,938	52,330
Metal, smelter	71,953	73,068	71,318	70,326	69,000

See footnotes at end of table.

Table 2.—Malaysia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Titanium: Ilmenite concentrate, gross weight[3]	186,816	199,819	189,121	172,757	105,000
Tungsten, mine output, metal content	[r]37	[r]27	14	35	58
Zirconium: Zircon concentrate, gross weight[3]	927	1,271	470	680	1,500
NONMETALS					
Barite	5,079	1,401	--	19,365	22,800
Cement, hydraulic thousand tons	2,196	2,265	2,349	2,833	3,000
Clays: Kaolin	31,174	32,934	46,324	44,084	44,363
Nitrogen: N content of ammonia	39,800	52,000	41,100	37,000	27,800
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural (Sarawak):					
Gross million cubic feet	85,121	105,623	94,510	85,816	NA
Marketed do	35,624	39,528	29,249	23,124	NA
Petroleum and refinery products:[4]					
Crude thousand 42-gallon barrels	79,171	103,296	100,916	94,210	NA
Refinery products:					
Gasoline do	7,517	[e]9,000	NA	NA	NA
Jet fuel do	1,445	[e]1,700	NA	NA	NA
Kerosine do	2,311	[e]2,800	NA	NA	NA
Distillate fuel oil do	11,078	[e]13,000	NA	NA	NA
Residual fuel oil do	15,912	[e]19,000	NA	NA	NA
Other do	4,614	[e]5,500	NA	NA	NA
Refinery fuel and losses do	738	[e]900	NA	NA	NA
Total do	43,615	[e]51,900	NA	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]All production is from peninsular Malaysia (Malaya) unless otherwise specified. Table includes data available through June 16, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone), salt, and fertilizers are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Based on export figures.

[4]Includes production from Malaya, Sarawak, and Sabah.

TRADE

Exports of crude petroleum and tin remained the two major components of Malaysia's major export commodities. Export earnings from crude petroleum rose 6% to $3.1 billion from that of 1981, while export earnings from tin remained at about $980 million in 1982. Petroleum and tin alone contributed about 30% to Malaysia's total foreign exchange earned. Other export minerals included copper concentrate, bauxite, and other minor metals that earned about $90 million.

Imports of machinery, transport equipment, and manufactured goods continued to increase at a rate of about 14% per year during 1981-82. The combined import bills of these capital and manufactured goods were valued at $8.2 billion in 1982 and accounted for about 60% of the total imports. To meet the requirements of domestic oil refineries, Malaysia also imported about $980 million of heavier crude petroleum.

The Malaysian external trade by major component during 1981-82 was as follows, in billion dollars:[4]

Table 3.—Malaysia: Trade by major components

(Billion U.S. dollars)

	1981	1982[e]
Exports:		
Petroleum	2.93	3.09
Manufactured goods	2.87	3.29
Rubber	1.80	1.94
Sawed logs	1.01	1.06
Palm oil	1.25	1.45
Tin	.98	.98
Other	1.34	1.46
Total	12.18	13.27
Imports:		
Machinery and transport equipment	4.70	5.35
Manufactured goods	2.51	2.81
Food, beverages, tobacco	1.30	1.46
Petroleum	.87	.89
Other	2.70	3.08
Total	12.08	13.59
Overall trade balance	+.10	-.32

[e]Estimated.

Japan, the United States, Singapore, Australia, the United Kingdom, the Federal

Republic of Germany, and the Netherlands remained the major trade partners of Malaysia.

Table 4.—Malaysia: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	470,151	718,300	--	Japan 539,600; Denmark 13,000.
Oxides and hydroxides	10	6	--	All to Singapore.
Metal including alloys:				
Scrap	2,578	3,018	6	Japan 2,080; Pakistan 323.
Unwrought	56	93	NA	Singapore 68.
Semimanufactures	2,547	4,507	11	Singapore 2,742; China 447.
Chromium: Ore and concentrate	3	--		
Copper:				
Ore and concentrate	102,054	107,416	--	All to Japan.
Matte and speiss including cement copper	16	1	--	All to Singapore.
Metal including alloys:				
Scrap	5,413	5,789	20	Singapore 3,313; India 1,152.
Semimanufactures	651	560	--	Singapore 304; Japan 162.
Iron and steel:				
Iron ore and concentrate, including roasted pyrite	17,825	10,042	--	Singapore 9,774.
Metal:				
Scrap	13,770	10,804	--	Singapore 8,809.
Pig iron, cast iron, related materials	--	140	--	Singapore 111; Hong Kong 15; Japan 14.
Ferroalloys: Unspecified	898	331	NA	United Kingdom 319.
Steel, primary forms	250	61	NA	Singapore 35; Japan 26.
Semimanufactures:				
Bars, rods, angles, shapes, sections	4,257	2,334	2	Singapore 1,996; Saudi Arabia 133.
Universals, plates, sheets	2,487	2,670	--	Singapore 1,901; Indonesia 441.
Hoop and strip	249	43	--	Singapore 29; Burma 14.
Rails and accessories	882	27	--	Singapore 25; Brunei 2.
Wire	641	822	--	Singapore 310; Japan 162; Kenya 150.
Tubes, pipes, fittings	11,286	10,625	1,000	Singapore 6,450; Japan 1,396.
Castings and forgings, rough	1,337	2,640	5	Indonesia 1,241; Singapore 801.
Lead:				
Ore and concentrate	--	6	--	All to Singapore.
Oxides	2	--		
Metal including alloys:				
Scrap	131	48	--	All to Singapore.
Unwrought	694	851	--	Indonesia 557; Singapore 172.
Semimanufactures	209	112	19	Singapore 39; Japan 30.
Manganese: Oxides	11,500	--		
Mercury 76-pound flasks	232	--		
Nickel: Metal including alloys:				
Scrap	217	174	50	Singapore 57; Hong Kong 40.
Unwrought	76	50	24	Philippines 15; Hong Kong 6.
Semimanufactures	83	8	--	Hong Kong 5; Singapore 3.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$6	--	West Germany $5; Singapore $1.
Silver:				
Ore and concentrate[1] do.	$6,400	$6,513	$145	Netherlands $4,647; West Germany $833.
Waste and sweepings[1] do.	$162	$580	$398	West Germany $169.
Metal including alloys, unwrought and partly wrought do.	$71	$195	$87	Hong Kong $40; Indonesia $29.
Tin:				
Ore and concentrate	560	--		
Metal including alloys:				
Scrap	961	171	3	Singapore 145.
Unwrought	72,181	69,558	10,448	Netherlands 22,736; Japan 18,242.
Semimanufactures	82	21	--	Mainly to Hong Kong.
Titanium: Oxides	15	90	--	Hong Kong 34; Thailand 20.
Tungsten: Ore and concentrate	134	109	19	West Germany 50; India 20; Singapore 20.
Uranium and/or thorium: Ore and concentrate value, thousands	$142	$708	$88	Netherlands $415; Singapore $196.
Zinc:				
Oxides	374	466	--	Japan 342; Singapore 86.
Metal including alloys:				
Scrap	1,061	843	--	Singapore 274; Japan 153.
Semimanufactures	97	92	--	Burma 52; Indonesia 24.
Other:				
Ores and concentrates	214,676	200,567	31	Japan 173,236.
Oxides and hydroxides	--	8	--	All to Singapore.
Ashes and residues	--	26,400	--	Netherlands 13,318; Singapore 12,068.
Base metals including alloys, all forms value, thousands	--	$10	--	All to United Kingdom.

See footnotes at end of table.

Table 4.—Malaysia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	92	84	--	Japan 72; Singapore 12.
Grinding and polishing wheels and stones value, thousands	$42	$25	--	Singapore $22.
Asbestos, crude	48	--		
Barite and witherite	2,281	405	--	Brunei 400; Singapore 5.
Cement	74,618	62,290	--	Thailand 61,991.
Chalk	1,354	2,676	--	All to Singapore.
Clays and clay products:				
Crude, unspecified	29,452	27,145	--	Singapore 10,453; Japan 5,876.
Products:				
Nonrefractory value, thousands	$3,558	$1,458	--	Singapore $1,407.
Refractory including nonclay brick	154	599	--	Japan 586.
Diamond: Gem, not set or strung value, thousands	$4,736	$2,991	--	Belgium-Luxembourg $2,851.
Diatomite and other infusorial earth	304	115	--	Netherlands 100.
Feldspar, fluorspar, related materials:				
Unspecified	41	14	--	Singapore 10.
Fertilizer materials:				
Crude, n.e.s	520	1,250	--	Singapore 1,218.
Manufactured:				
Ammonia	437	237	--	Singapore 158; Thailand 78.
Nitrogenous	--	1,708	--	All to Singapore.
Potassic	--	2	--	All to Brunei.
Unspecified and mixed	838	5,034	--	Singapore 5,031.
Gypsum and plaster	2	20	--	Singapore 19; Australia 1.
Lime	18,314	15,750	--	Singapore 15,734.
Magnesium compounds: Magnesite	26	--		
Mica: Worked including agglomerated splittings	(2)	--		
Pigments, mineral: Iron oxides and hydroxides, processed	22	10	--	All to Singapore.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$318	$126	$1	West Germany $48; Japan $37.
Synthetic do	$280	$1,326	--	Japan $1,283.
Salt and brine	793	411	--	Philippines 336; Indonesia 40.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	657	217	--	Singapore 214.
Sodium hydroxide	1	16	--	Singapore 15; Indonesia 1.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	306	3,058	--	Singapore 2,965.
Dolomite, chiefly refractory-grade	8,327	4,484	--	Singapore 4,184; Papua New Guinea 300.
Gravel and crushed rock thousand tons	1,018	79	--	Brunei 42; Singapore 37.
Limestone other than dimension	489	13,641	--	All to Singapore.
Quartz and quartzite	5,010	3,970	--	Do.
Sand other than metal-bearing	364,541	181,435	--	Japan 104,445; Singapore 53,967.
Sulfur:				
Elemental:				
Crude including native and byproduct	10	12	--	All to Singapore.
Colloidal, precipitated, sublimed		1	--	All to Philippines.
Dioxide	703	--		
Sulfuric acid	--	220	--	All to Singapore.
Talc, steatite, soapstone, pyrophyllite	9	5	--	Do.
Other:				
Crude	15	--		
Slag and dross, not metal-bearing	329	44	--	Singapore 9; unspecified 35.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	4,268	5,947	--	Singapore 4,037; Hong Kong 843.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	10	40	--	All to Singapore.
Carbon: Carbon black	3,590	7,353	--	Indonesia 4,301; Singapore 2,822.
Coal: All grades excluding briquets	71,438	53,238	800	Panama 12,330; Singapore 9,112; Republic of Korea 3,207.
Coke and semicoke	15	12	--	Thailand 10.
Gas, natural value, thousands	--	$7	--	All to Singapore.
Hydrogen, helium, rare gases do	$9	$51	--	Singapore $42.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	92,770	80,834	22,637	Japan 34,806; Singapore 16,658.

See footnotes at end of table.

Table 4.—Malaysia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	(3)	--		
Gasoline: Motor do	1,377	1,262	--	Singapore 1,261.
Mineral jelly and wax do	1	(3)	--	Mainly to Thailand.
Kerosine and jet fuel do	289	319	--	Mainly to Singapore.
Distillate fuel oil do	48	49	--	Singapore 48.
Lubricants do	170	151	--	Singapore 106; Indonesia 17.
Residual fuel oil do	1,594	1,141	19	Singapore 427; Japan 120; United Kingdom 115.
Bitumen and other residues do	(3)	(3)	--	All to Singapore.
Bituminous mixtures do	1	1	--	Mainly to Singapore.
Tars and other crude chemicals derived from coal, gas, and petroleum	544	299	--	Singapore 279; Thailand 12.

NA Not available.
[1]May include platinum-group metals.
[2]Unreported quantity valued at $1,000.
[3]Less than 1/2 unit.

Table 5.—Malaysia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
METALS				
Alkaline and rare-earth metals:				
Unspecified	59	86	42	Japan 31.
Aluminum:				
Ore and concentrate	825	800	--	All from China.
Oxides and hydroxides	10,241	6,878	99	Japan 5,226; China 650.
Metal including alloys:				
Scrap	17	309	--	Singapore 275; Thailand 23.
Unwrought	14,489	16,483	2,593	Canada 7,551; Ghana 3,249.
Semimanufactures	22,951	20,993	2,516	Sweden 6,457; Japan 3,263.
Chromium:				
Ore and concentrate	85	390	--	West Germany 360.
Oxides and hydroxides	60	96	9	West Germany 42; Japan 29.
Cobalt: Oxides and hydroxides	145	22	--	Japan 17.
Copper:				
Ore and concentrate	1	5	--	Singapore 3; Australia 1; United Kingdom 1.
Metal including alloys:				
Scrap	91	76	18	Singapore 56.
Unwrought	111	34	--	United Kingdom 17; West Germany 12.
Semimanufactures	15,875	23,379	585	Japan 9,793; Australia 7,143.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	--	69,378	--	India 44,641; Australia 24,737.
Metal:				
Scrap	6,345	4,162	1,149	Japan 729; Sweden 633.
Pig iron, cast iron, related materials	16,565	14,366	75	Australia 6,430; China 3,858; Japan 2,719.
Ferroalloys:				
Ferromanganese	4,073	3,794	1	Japan 3,181; Australia 153.
Unspecified	757	1,885	122	Norway 275; Australia 190; Japan 154.
Steel, primary forms	159,579	241,273	2	Republic of Korea 65,543; Japan 26,322.
Semimanufactures:				
Bars, rods, angles, shapes, sections	308,707	455,964	845	Japan 283,214; Singapore 58,517.
Universals, plates, sheets	542,494	550,427	2,905	Japan 426,491; Republic of Korea 67,746.
Hoop and strip	16,509	18,596	74	Japan 12,383; Singapore 1,855.

See footnotes at end of table.

Table 5.—Malaysia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Rails and accessories	41,677	21,016	24	Poland 7,515; United Kingdom 4,752.
Wire	17,951	21,602	88	China 7,979; Japan 6,470.
Tubes, pipes, fittings	43,028	70,076	5,600	Japan 49,227; United Kingdom 4,658.
Castings and forgings, rough	3,677	2,140	1	United Kingdom 575; Singapore 208.
Lead:				
Ore and concentrate	--	1	--	All from Singapore.
Oxides	976	1,137	43	Singapore 229; West Germany 54.
Metal including alloys:				
Scrap	1,443	486	2	Singapore 402; Japan 78.
Unwrought	5,367	6,174	54	Australia 5,686.
Semimanufactures	5,558	2,785	1,334	Australia 516; Singapore 348.
Magnesium: Metal including alloys:				
Unwrought	6	3	2	United Kingdom 1.
Semimanufactures	7	1,642	--	West Germany 1,638.
Manganese:				
Ore and concentrate, metallurgical-grade	2,498	2,351	--	Singapore 2,318.
Oxides	1,678	1,433	1	Japan 832; Singapore 356.
Mercury 76-pound flasks	87	2,988	--	United Kingdom 1,479.
Molybdenum: Metal including alloys, all forms	2	11	3	Netherlands 3.
Nickel:				
Ore and concentrate	6	3	2	Finland 1.
Matte and speiss	1	13	--	Japan 10.
Metal including alloys:				
Scrap	4	61	10	China 50.
Unwrought	6,889	3,322	1,944	Japan 1,106; France 113.
Semimanufactures	1,194	676	426	Japan 104; Philippines 27.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$22	$6	--	West Germany $5.
Silver:				
Ore and concentrate[1] do	$1	$17	--	West Germany $8; United Kingdom $8.
Waste and sweepings[1] do	$2	$93	$81	Singapore $10.
Metal including alloys, unwrought and partly wrought do	$580	$2,636	$100	United Kingdom $951; Singapore $687.
Tin:				
Ore and concentrate	18,865	16,771	--	Australia 12,754; Burma 1,246.
Metal including alloys:				
Scrap	--	5	5	
Unwrought	323	291	64	Singapore 132; Japan 29.
Semimanufactures	240	93	12	Hong Kong 46; Singapore 14.
Titanium: Oxides	5,327	4,999	557	Japan 1,056; United Kingdom 1,023.
Tungsten:				
Ore and concentrate	147	97	--	Japan 30.
Metal including alloys, all forms	59	51	1	Singapore 33; United Kingdom 12.
Uranium and/or thorium:				
Ore and concentrate value, thousands	$51	$163	--	All from North Korea.
Metal including alloys, all forms do	$1	$3	NA	Sweden $2.
Zinc:				
Ore and concentrate	53	6	--	All from Australia.
Oxides	333	253	1	Singapore 105; West Germany 56.
Metal including alloys:				
Scrap	540	190	--	Australia 144; Japan 21.
Unwrought	14,177	16,097	--	Australia 10,989; Canada 2,857.
Semimanufactures	2,911	817	6	North Korea 214; Japan 151.
Other:				
Ores and concentrates	54	120	--	United Kingdom 65.
Oxides and hydroxides	--	493	14	Norway 169; Japan 144.
Base metals including alloys, all forms value, thousands	$464	$361	$40	Thailand $167; United Kingdom $93.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	241	297	52	Japan 173; Singapore 20.
Artificial: Corundum	7	2	--	United Kingdom 1.
Dust and powder of precious and semi-precious stones, excluding diamond value, thousands	$7	$103	--	Japan $102.

See footnotes at end of table.

Table 5.—Malaysia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Abrasives, n.e.s. —Continued				
Grinding and polishing wheels and stones ____ value, thousands__	$2,374	$3,268	$89	Japan $977; China $488.
Asbestos, crude	37,861	32,242	2,267	Canada 15,553; Singapore 10,592.
Barite and witherite	224	6,424	452	Singapore 3,398; Thailand 2,050.
Boron materials:				
Crude natural borates	52	--	--	
Oxides and acids	175	102	42	Romania 45.
Cement	461,277	667,272	697	Singapore 333,910; Japan 190,053.
Chalk	219	136	--	Japan 70; West Germany 7.
Clays and clay products:				
Crude, unspecified	28,439	40,915	19,409	Japan 7,438; West Germany 4,825.
Products:				
Nonrefractory value, thousands__	$10,819	$16,832	$3	Italy $6,993; Japan $2,661.
Refractory including nonclay brick	109,147	13,752	248	Japan 5,441; United Kingdom 3,813.
Diamond:				
Gem, not set or strung value, thousands__	$4,073	$4,722	$24	France $2,486; Belgium-Luxembourg $1,531.
Industrial ____ do____	$135	$369	--	All from Belgium-Luxembourg.
Diatomite and other infusorial earth	910	853	744	Philippines 75; Japan 32.
Feldspar, fluorspar, related materials:				
Unspecified	15,802	13,700	--	India 8,394; China 3,260.
Fertilizer materials:				
Crude, n.e.s	224,862	346,099	60	Christmas Island 165,859; Jordan 79,841.
Manufactured:				
Ammonia	488	2,122	20	Ireland 843; Japan 77.
Nitrogenous	379,050	320,099	42,092	West Germany 73,113; U.S.S.R. 57,072.
Phosphatic	20,270	13,386	6,041	Tunisia 3,140; West Germany 1,055; Netherlands 1,000.
Potassic	378,112	475,741	56,972	Canada 169,525; West Germany 127,204; U.S.S.R. 76,295.
Unspecified and mixed	171,862	151,770	9,023	West Germany 97,968; Belgium-Luxembourg 16,067.
Graphite, natural	465	716	7	China 455; United Kingdom 46.
Gypsum and plaster	94,931	125,316	13	Thailand 117,640; Japan 5,692.
Halogens: Unspecified value, thousands__	$229	$280	$247	United Kingdom $14.
Lime	3,271	3,283	--	Singapore 2,716; China 525.
Magnesium compounds: Magnesite	3,192	5,580	--	Spain 4,646; China 483.
Mica:				
Crude including splittings and waste	39	111	6	Singapore 77; United Kingdom 21.
Worked including agglomerated splittings	47	27	--	France 12; United Kingdom 12.
Pigments, mineral: Iron oxides and hydroxides, processed	5,934	1,783	--	West Germany 1,048; United Kingdom 385.
Precious and semiprecious stones other than diamond:				
Natural ____ value, thousands__	$788	$4,722	$24	France $2,486; Belgium-Luxembourg $1,531.
Synthetic ____ do____	$50	$369	--	All from Belgium-Luxembourg.
Salt and brine	203,909	154,531	537	Thailand 99,349; Australia 33,000.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	419	402	1	West Germany 126; Spain 122.
Sodium carbonate, natural and manufactured	45,084	50,122	10	Kenya 35,937; Japan 5,668.
Sodium hydroxide	13,542	3,864	618	West Germany 2,135; United Kingdom 334.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	125,814	37,269	--	Indonesia 34,171; Italy 2,077.
Worked	1,054	1,499	--	China 966; Italy 321.
Dolomite, chiefly refractory-grade	307	256	--	Norway 54; unspecified 202.
Gravel and crushed rock	5,178	11,761	--	Brunei 7,463; India 2,812.
Limestone other than dimension	446	830	--	Japan 378; Singapore 180.
Quartz and quartzite	99	97	36	Italy 48; Netherlands 7.
Sand other than metal-bearing	2,176	1,214	589	West Germany 304; Japan 115; China 112.

See footnotes at end of table.

Table 5.—Malaysia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	22,633	10,257	12	Singapore 9,443; West Germany 459.
Colloidal, precipitated, sublimed	4,578	5,430	62	Singapore 4,470; West Germany 243.
Sulfuric acid	372	93	11	China 67.
Talc, steatite, soapstone, pyrophyllite	17,975	6,085	30	China 2,218; Japan 1,039.
Other:				
Crude	7,208	2,707	55	West Germany 2,172; China 170.
Slag and dross, not metal-bearing	8,570	11,325	21	Japan 8,769; United Kingdom 1,464.
Oxides and hydroxides of barium, magnesium, strontium	543	735	68	Japan 227; China 200.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	8,690	10,367	968	Singapore 7,149; Japan 1,607.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3,347	11,993	24	Singapore 8,832; China 2,859.
Carbon: Carbon black	52,769	1,637	181	Australia 580; Japan 542.
Coal:				
Anthracite and bituminous	24,799	49,424	--	Indonesia 48,827.
Lignite including briquets	880	796	--	All from Australia.
Coke and semicoke	29,480	30,520	--	Japan 27,668.
Gas, natural value, thousands	$7,903	$16,808	$5	Singapore $16,685.
Gas, manufactured do	--	$1	$1	
Peat including briquets and litter	--	1	--	All from Australia.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	32,303	28,517	--	Saudi Arabia 21,944.
Refinery products:				
Liquefied petroleum gas do	(2)	12	(2)	NA.
Gasoline: Motor do	2,856	4,211	(2)	Singapore 3,999; Bahrain 190.
Mineral jelly and wax do	79	72	1	Indonesia 24; China 23.
Kerosine and jet fuel do	1,136	1,458	1	Singapore 1,406; Bahrain 50.
Distillate fuel oil do	12,007	12,311	--	Singapore 11,800.
Lubricants do	1,001	938	30	Singapore 804.
Residual fuel oil do	3,431	4,856	12	Singapore 4,421; Australia 44.
Bitumen and other residues do	154	207	(2)	Singapore 193.
Petroleum coke do	23	(2)	--	Mainly from Japan.
Tars and other crude chemicals derived from coal, gas, and petroleum	20,099	20,347	468	Singapore 18,260.

NA Not available.
[1]May include platinum-group metals.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The mine production of bauxite from the Telok Ramunia Mine in South Johor continued to decline. The monthly output averaged about 50,000 tons. A further reduction in exports of bauxite, particularly to Japan, forced the mine to cutback its output. In 1981, export earnings of bauxite rose slightly to $9.6 million despite an 11% drop in export quantity to 642,450 tons.

Copper.—Production of copper at the Mamut copper mine continued at a monthly average of 500,000 tons of ore and about 11,000 tons of concentrate, grading about 24% copper. Overseas Mineral Resources Development Sabah Bhd., the operator, is jointly owned by Overseas Mineral Resources Development Co. of Japan (51%) and the Sabah state Government (49%). Malaysia exported all of its copper concentrate to Japan.

The Sabah state Government decided to drop plans to build the $152 million copper smelter in Kota Belud, Sabah. According to the state Government officials, low copper prices and insufficient ore supply from the

Mamut Mine were cited as the main reasons for dropping the plans.[5]

A copper-molybdenum deposit was discovered in the Sokor area of Ulu Kelantan, about 168 miles northeast of Kuala Lumpur. Further prospecting was being carried out by the Malaysian Geological Survey and the Canadian Industrial Development Authority.

Iron and Steel.—The mine output of iron ore from eight operating mines declined substantially. The largest iron mine at Gunung Jerain in Kedah, accounted for 21% of the total output. About three out of seven small mines operating in Perak and two out of four small mines operating in Johor were either temporarily shut down or closed down entirely. In 1981, about 31,000 tons of iron ore was exported principally to Singapore and Thailand, and the remainder was shipped to the country's only iron reduction plant, owned and operated by Malayawata Steel Bhd., in the Patani area of South Kedah.

In March 1982, a formal agreement was signed between Malaysia state-owned Heavy Industries Corp. (HICOM) and a Japanese consortium led by Nippon Steel Corp. to build a 600,000-ton-per-year, direct-reduction sponge iron plant and a 560,000-ton-per-year billets plant at Telok Kalong industrial estate on the central Terengganu coast. The construction work of the $449 million complex began in April and was scheduled for completion in 1985.

The project was to be financed by a $108 million capital investment with the Japanese consortium holding 30% and HICOM 70%, a $276 million loan from Japan's Export-Import Bank carrying an annual interest rate of 7.25% for 10 years, and a $65 million credit extended by the Japanese consortium carrying an annual interest rate of 6.5% over a 10-year period.[6]

The first direct-reduction iron plant of Malaysia with an annual capacity of 650,000 tons was being built on Labuan Island of Sabah by Voest-Alpine AG of Austria and Midrex Corp. of the United States for startup in mid-1984. In September 1982, Sabah Gas Industries signed an agreement with Voest-Alpine and Midrex to modify the direct-reduction iron facility. The modification was to use the new hot-briquetting process of Midrex. Because hot briquets are easier to handle, store, and transport in all weather conditions, the modification was of primary importance because the output from the plant will be exported exclusively to the steel industries of ASEAN and other Far East countries.

Malaysia will import about 250,000 tons of iron ore pellets from India annually over a 3-year period starting in 1984 under an agreement signed in March 1982. The iron ore pellets from India will be used by the direct-reduction iron plant on Labuan Island. Other possible sources of raw materials being considered were the Hamersley and Mount Newman Mines of Australia, and the Mutuca Mine of Brazil for lump ore; Luossavaara Kiirunavaara AB of Sweden, Cia. Vale do Rio Doce and Samarco Mineração S.A. of Brazil for pellets, and Australia for coal.[7]

Tin.—Mine production of tin metal dropped 13% to 52,000 tons mainly because of low tin prices, high production costs, and lower ore grades. The average market price of tin metal in Penang, Malaysia, dropped from $14.40 per kilogram in 1981 to $12.80 per kilogram in 1982. According to industry sources, because of the persistently higher energy costs, the average cost of production of tin metal, which excluded export duty and royalties for the dredging sector, rose 16.8% to $8.73 per kilogram during the second half of 1981. If export duty and royalties were included, the average production costs for the dredging sector was $11.60 per kilogram compared with $15.10 per kilogram for the gravel pump sector.[8] Because of increasing difficulty in renewing and obtaining mining leases and permits from the state Government because of state land policies, many alluvial land deposits were being worked up for the fourth time. As a result, the average ore grades gradually declined over the past years.

The total number of active production units declined from 730 units at the end of September 1981 to 671 units at the end of September 1982. Of the 671 units operating in September 1982, 559 units were gravel pumps, 47 were open casts, 42 were dredges, 20 were underground, and 3 were others. Of the total tin concentrates produced in the first 9 months of 1982, 53.0% was mined by gravel pumping, 31.5% was by dredging, 4.8% was by open casting, 1.4% was by underground mining, and 9.3% was by dulang washing, retreatment, and other methods of mining. Production of tin concentrates was mainly in Perak, 55%; Selangor, 34%; and the other 8 States, Pahang, West Persekutuan, Johor, Terengganu, Kedah,

North Sembilan, Melaka, and Perlis, 11%.

The total number of workers employed in the tin mining industry was about 31,000 persons at the end of September 1982 compared with about 35,100 persons at the end of September 1981. Most reduction in employment of the tin industry, reportedly, was in the gravel pump sector. During 1981, 153 gravel pump mines were closed down owing to low tin prices, and about 3,800 workers lost their jobs. During the first 2 months of 1982, an additional 26 gravel pump mines were shut down and 370 workers were laid off.

Exports of tin for the first 9 months in 1982 fell sharply by 25% to 36,942 tons from that of the same period in 1981. Export earnings of tin for the first 9 months in 1982 also dropped drastically by more than 25% to $484 million from that of the same period in 1981.

A feasibility study prepared by Pernas Charter Management Co. on the joint venture project to develop the Kuala Langat tin deposit in Selangor was completed in mid-1982. The estimated cost of developing the most complex alluvial tin mining operation was about $211 million. The alluvial tin ore body is buried up to 300 feet deep with overburden ranging from 100 to 150 feet thick and covers an area of 4,000 acres. Kuala Langat Mining Sdn. Bhd., the operator of the project, is 65% owned by Kumpulan Perangsang Selangor (KPS), a state-owned corporation; 30% by the Malaysia Mining Corp. (MMC); and 5% by the Tronoh Mines Malaysia. The capitalized equity is $25 million.

Because of the weakened demand for tin and the depressed prices on the world markets, the Government of Malaysia planned to reduce its tin production by 15,000 tons per year starting in 1983. According to industry sources, the planned cutback in production, which represents a 22% reduction in Malaysia's annual tin output and about 7% of the world's total output, was aimed to close down the high cost and less-efficient small gravel pump mines. However, the development of Kuala Langat tin deposit by KPS and MMC will not be affected.[9]

After an appeal of the tin industry to the Government to reform the tax structure of the export duty on tin because of the increasing cost of production, the Government of Malaysia decided to increase the so-called threshold price to $11.16 per kilogram beginning in fiscal year 1983 from $9.79 per kilogram in fiscal year 1982. The threshold price is the base price on which a 20% export duty will be imposed.

An attempt to form a tin producers association was first proposed by Malaysia to Thailand in February 1982, and later to Indonesia. Several meetings were held in Bangkok, Jakarta, and Kuala Lumpur among Malaysia, Thailand, and Indonesia. In November, a new proposal was presented by Malaysia to Australia, Bolivia, Indonesia, Nigeria, Thailand, and Zaire at the annual conference held in Lagos, Nigeria. However, a formal agreement was not signed because of a deadlock between Malaysia and Indonesia regarding the voting rights, export control, and buffer stockpiling arrangements. The next meeting was scheduled in London in February 1983. According to Malaysian Government officials, the major activities of the proposed tin producers association include research and development, joint marketing, and other measures to safeguard the tin industry of member countries that were not covered in the Sixth International Tin Agreement.[10]

NONMETALS

Cement.—The combined annual clinker capacity of five cement companies remained at 3.2 million tons. The construction work on a 1.2-million-ton-per-year cement plant in Pulau Langkawi was started early in the year by Ishikawajima-Harima Heavy Industries Co. Ltd. of Japan. The new cement plant was scheduled for completion in late 1982. Kedah Cement Sdn. Bhd., the owner of the plant, planned to add another 1.2-million-ton-per-year capacity to the plant under construction. The estimated cost of the expansion program was about $169 million.

Associated Pan Malaysia Cement Sdn. Bhd. was to spend about $63 million to convert from the existing wet-process plant to the more energy-efficient dry-process plant at Chemor near Rawang, Selangor, between 1982 and 1984.

Fertilizer Materials.—A $250 million contract was awarded by ASEAN Bintulu Fertilizer to Kobe Steel in July. The contract calls for Kobe Steel to build a natural gas-based ammonia-urea plant at Bintulu, Sarawak, on a turn-key basis.

Kobe Steel was to provide the engineering, equipment, construction, and commissioning. The Friedrich Uhde GmbH of the

Federal Republic of Germany and Nichimen Corp. of Japan were to serve as consultants to Kobe Steel. The complex was scheduled for completion in the second half of 1985. It will have a capacity of 1,000 tons per day of ammonia and 1,500 tons per day of granulated urea. The Uhde process of the Federal Republic of Germany would be used for the ammonia production, and Stamicarbon of the Netherlands and Nederlandse Stickstoff Maatschappij process of Belgium, for urea production.

Of the total cost of the project, about $142 million credit would be extended by the Government of Japan through the Overseas Economic Cooperation Fund, a $58 million loan by Japan's Export-Import Bank, and the remainder, $127 million, was to be contributed by Malaysia, 60%; Indonesia, Thailand, and the Philippines, 13% each; and Singapore, 1%.[11]

MINERAL FUELS

Natural Gas.—The construction work for the first-stage production of LNG at Tanjung Kidurong in Bintulu, Sarawak, was completed by the end of 1982. The first-stage production was scheduled to start in January 1983. The Bintulu LNG complex is Malaysia's first and one of the world's largest LNG plants. The construction of the plant involved more than 4,000 workers, and took 3 years to complete; the entire project was estimated to cost nearly $3.1 billion. It included a $1.7 billion LNG plant at Tanjung Kidurong, a $280 million pipeline system connecting the LNG plant and offshore central Luconia Gasfields, a $250 million deepwater port at Bintulu, and an $850 million fleet of five gas-carrying tankers for the transport of LNG between Malaysia and Japan.

Under a 20-year contract, Malaysia was to export to Japan about 1.7 million tons of LNG in 1983, 3 million tons in 1984 increasing to 4.5 million tons in 1985, and 6 million tons in 1986 at full-capacity operation. The Government of Malaysia estimated that export earnings from LNG will be about $450 million dollars in 1983 and will be about $1.6 billion in 1986. The negotiated export price of Malaysian LNG for the 1983 shipments was, reportedly, about $6 per million British thermal units.[12]

In November 1982, a contract was signed between Petroleum National Bhd. (Petronas), the state-owned oil and gas company, and Esso Production Malaysia Inc. (EPMI) for the purchase of associated gas in conjunction with the crude oil production from EPMI's oilfields at Bekok, Pulai, and Tapis, off the east coast of Terengganu. The contract represents the beginning and the first domestic use of gas for the production of liquefied propane gas and for the 450-megawatt, gas-fired power station at Paka in Terengganu.

Under the contract, EPMI was to spend about $170 million for the installation of a gas-gathering network and a pipeline connecting its oilfields to the Petronas Carigali Sdn. Bhd. contract area over the next 2 to 3 years. Petronas was also to spend about $500 million for its own gas project. The gas project included installation of six platforms in the Petronas Carigali contract area, and a 149-mile gas pipeline connecting the Duyong and Sotong Gasfields to the stabilization facilities at Karteh, Terengganu. The Petronas project was scheduled for completion in 1984.[13]

In 1982, Malaysia's nonassociated natural gas reserves were revised to 39 trillion cubic feet from 36 trillion cubic feet in 1981. Associated natural gas reserves were estimated at 10 trillion cubic feet in 1982.[14]

Petroleum.—Malaysian crude oil production increased to an average of 297,000 barrels per day in 1982 from an average of 258,000 barrels per day in 1981. About 42% of the total output was produced by EPMI from the Bekok, Pulai, and Tapis Oilfields off the east coast of Terengganu; 39% was produced by Sarawak Shell Bhd. from Baka, Baram, Baronia, Betty, Fainley-Baram, West Lutong, Temana, and the Tukau Oilfields off Sarawak; and 19% was produced by Sabah Shell Petroleum Co. from the Semarang and South Furious Oilfields off Sabah.

All three companies were operated under production-sharing agreements with Petronas. Under the fourth 5-year plan, the crude oil output will tentatively be increased to 362,000 barrels per day by 1985. To increase export earnings from crude petroleum, the Government of Malaysia began to relax the conservation efforts under the National Petroleum Depletion Policy in 1982.

Export earnings from crude oil rose about 6% to $3.1 billion from that of 1981, and accounted for 27.5% of total export earnings. The major buyers of Malaysian crude oil were Singapore, Japan, and Thailand. Malaysia imported about $980 million of

heavier crude oil principally from Saudi Arabia, the United Arab Emirates, and Iran. The imported heavier crude was mixed with the domestic lighter crude at a ratio of 70% to 30% to meet the designed raw material requirements of the Malaysia refineries.

Two oil wells were discovered in Malaysia. The first discovery was by Petronas Carigali, a wholly owned subsidiary of Petronas, about 78 miles offshore west of Kuala Terengganu. Production tests recorded a total of 5,565 barrels per day of oil and 10 million cubic feet per day of nonassociated natural gas. The second oil well was discovered by Carigali-BP, about 9 miles west of Kudat Peninsula, Sabah. The well flowed 1,740 to 2,050 barrels per day of oil and 8.5 million cubic feet per day of gas. Carigali-BP is a joint venture company, 50% owned by Petronas Carigali, 42.5% by British Petroleum Corp., and 7.5% by Oceanic Exploration Co.

In November, an important joint venture exploration and production-sharing agreement was signed between Petronas and Société National Elf Aquitaine (SNEA) of France. Under the agreement, SNEA was granted a 5-year exploration in a concession area of 12,650-square-kilometers off the coast of Sarawak. SNEA, the fifth foreign driller to enter into a production-sharing agreement, was expected to spend about $50 million and to drill a minimum of six wells over the next 5-year period. The first two foreign companies to enter into the production-sharing agreement with Malaysia were Royal Dutch/Shell and EPMI in 1976, followed by British Petroleum and Oceanic Exploration in 1980.[15]

The construction of Petronas' first refinery with a 30,000-barrel-per-day capacity was started by JGC Corp. (Nikki) of Japan at Kertoh in Terengganu. The refinery was scheduled for completion in 1984. Petronas planned to build another oil refinery with a capacity of 120,000 barrels per day at Tanga Batu, Sungai Udang, in Malacca. Invitations for prequalification of contractors for the refinery was issued in August 1982. The contract was expected to be awarded in 1983. According to the Petronas plans, the refinery was scheduled for completion in 1987.[16]

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[1]Economist, Division of Foreign Data.
[2]Far Eastern Economic Review (Hong Kong). V. 118, No. 44, October 1982, p. 28.
[3]Where necessary, values have been converted from Malaysian dollars (M$) to U.S. dollars at the rate of M$2.3=US$1.00 in 1981 and M$2.365=US$1.00 in 1982.
[4]Financial Times (London). Financial Time Survey-Malaysia. Aug. 31, 1982, p. 6.
[5]The Asian Wall Street Journal. V. 7, No. 62, Nov. 25, 1982, p. 2.
[6]———. V. 6, No. 132, Mar. 8, 1982, p. 3.
[7]Metal Bulletin (London). No. 6672, Mar. 13, 1982, p. 39.
American Metal Market. V. 90, No. 59, Mar. 26, 1982, p. 3.
[8]Tin News (Washington, D.C.). V. 32, No. 6, June 15, 1982, p. 3.
[9]Business Times (Kuala Lumpur). Feb. 10, 1982, pp. 1-2, June 16, 1982, p. 1.
[10]New Straits Times (Kuala Lumpur). May 17, 1982, p. 16.
Business Times (Kuala Lumpur). June 21, 1982, p. 1.
The Asian Wall Street Journal. V. 7, No. 67, Nov. 6, 1982, p. 4.
[11]Business Times (Kuala Lumpur). July 10, 1982, p. 2.
[12]The Asian Wall Street Journal. V. 7, No. 106, Jan. 31, 1983, p. 1.
Tokyo Petroleum News (Tokyo). V. 22, No. 224, Dec. 17, 1983, p. 2.
[13]Petroleum News (Hong Kong). V. 13, No. 4, July 1982, p. 28.
U.S. Embassy, Kuala Lumpur, Malaysia. State Department Telegram 00026, Jan. 3, 1983, p. 3.
[14]Oil and Gas Journal. V. 80, No. 49, Dec. 6, 1982, p. 99.
[15]Second work cited in footnote 13, pp. 1-2.
[16]Business Times (Kuala Lumpur). Aug. 24, 1982, p. 1.
Oil and Gas Journal. V. 80, No. 40, Oct. 4, 1982, p. 58.

The Mineral Industry of Malta

By Walter G. Steblez[1]

In 1982, as in previous years, Malta had to largely rely upon imports of mineral raw materials, fuels, and food; the country was only a modest producer of limestone and salt. The economy was based primarily on transshipment and reexport of goods.

Among the largest investment projects during the year was the planned development of the $110 million deepwater Marsaxlokk Port on the southern end of the island. When completed the port would serve as a coal terminal that would accommodate vessels with up to 200,000 deadweight tons, and would have a 4.5- to 5.5-million-ton-per-year coal handling capacity. Other storage and transshipment facilities were to be upgraded at Grand Harbor. These included expanded storage facilities for refined fuel oil bunkering as well as crude oil for eventual transshipment to European refineries.

During the year, the Maltese Government offered offshore petroleum production sharing contracts to foreign oil firms. These firms were to be serviced by the Government-controlled Mediterranean Oilfield Services Co. Ltd.

[1]Foreign mineral specialist, Division of Foreign Data.

Table 1.—Malta: Production of mineral commodities[1]

Commodity		1978	1979	1980	1981[p]	1982[e]
Lime	thousand metric tons	28	30	31	32	32
Limestone	thousand cubic meters	[r e]382	400	400	410	410
Salt	metric tons	600	500	550	540	530

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 6, 1983.

Table 2.—Malta: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Waste and scrap	130	39	--	Italy 35; Belgium-Luxembourg 4.
Semimanufactures value	$274,695	$583,290	--	Libya $516,837; Italy $38,887; Lebanon $19,716.
Copper: Metal including alloys:				
Scrap	450	470	--	Netherlands 133; Belgium-Luxembourg 121; Spain 82.
Semimanufactures value	$75,483	$204,345	--	Saudia Arabia $175,589; Denmark $16,593.

Table 2.—Malta: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	5,828	3,728	--	Italy 3,389; Netherlands 256; United Kingdom 36.
Pig iron, cast iron, related materials	--	1	--	All to Czechoslovakia.
Semimanufactures:				
Bars, rods, angles, shapes, sections ---- value	$28,932	$16,873	--	United Kingdom $12,873; Czechoslovakia $4,000.
Universals, plates, sheets ---- do	$2,259	$3,667	--	All to Italy.
Hoop and strip ---- do	$20	--		
Wire ---- do	$268,932	$4,480	--	Italy $4,005; West Germany $475.
Tubes, pipes, fittings ---- do	$1,130	$3,798	--	Norway $3,540; Libya $258.
Lead: Metal including alloys:				
Scrap	353	125	--	Belgium-Luxembourg 90; Denmark 35.
Semimanufactures ---- value	--	$13	--	All to West Germany.
Nickel: Metal including alloys:				
Scrap	2	7	--	Netherlands 4; United Kingdom 2.
Semimanufactures ---- value	$15,290	$899	--	All to West Germany.
Silver: Metal including alloys, unwrought and partly wrought ---- troy ounces	186	1,309	--	United Kingdom 643; West Germany 611.
Tin: Metal including alloys, semimanufactures ---- value	$12,475	--		
Zinc: Metal including alloys, scrap	17	81	--	Netherlands 52; United Kingdom 28.
Other: Ashes and residues	--	4	--	All to United Kingdom.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc ---- value	--	$7,065	--	All to Italy.
Dust and powder of precious and semiprecious stones including diamond ---- do	$18,323	--		
Grinding and polishing wheels and stones ---- do	$648,994	$693,583	--	Yugoslavia $393,267; Algeria $135,782; France $67,220.
Cement ---- kilograms	50	--		
Clays and clay products:				
Crude, unspecified	--	140	--	All to Libya.
Products, nonrefractory ---- value	$776	$950	$589	United Kingdom $258; Italy $103.
Diamond:				
Gem, not set or strung value, thousands	$1,125	$2,307	--	Belgium-Luxembourg $2,211; United Kingdom $96.
Industrial ---- do	$918	--		
Diatomite and other infusorial earth value	$53,419	--		
Mica: Worked including agglomerated splittings ---- do	--	$31,132	--	Yugoslavia $27,179; Italy $3,953.
Precious and semiprecious stones other than diamond: Natural ---- do	$161,157	--		
Stone, sand and gravel: Dimension stone:				
Crude and partly worked ---- do	$3,100	$2,453	--	All to Tunisia.
Worked ---- do	$4,783	$7,876	--	United Kingdom $7,773.
Sulfur: Elemental, colloidal, precipitated, sublimed	20	--		
MINERAL FUELS AND RELATED MATERIALS				
Petroleum and refinery products:				
Partly refined ---- 42-gallon barrels	16,425	--		
Refinery products: Lubricants ---- do	6,103	[1]6,897	--	Egypt 7; bunkers 6,888.

[1]Excludes lubricants valued at $1,188.

Table 3.—Malta: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified—value	--	$10	--	All from United Kingdom.
Aluminum: Oxides and hydroxides—do	$18,399	$10,017	--	Yugoslavia $4,287; West Germany $2,513; France $2,381.
Metal including alloys: Unwrought—do	$18,388	$8,108	--	All from United Kingdom.
Semimanufactures value, thousands	$5,604	$3,992	$7	Italy $2,710; United Kingdom $562; Netherlands $289.
Chromium: Oxides and hydroxides value	--	$4,199	--	All from United Kingdom.
Copper: Metal including alloys: Unwrought	16	(1)	--	All from West Germany.
Semimanufactures value, thousands	$3,643	$3,834	$5	West Germany $1,777; United Kingdom $980; Denmark $124.
Gold: Waste and sweepings—value	--	$142,726	--	All from United Kingdom.
Metal including alloys: Unwrought—troy ounces	3,918	8,488	--	West Germany 6,527; United Kingdom 1,961.
Partly wrought—value	$57,513	$78,990	--	Italy $36,919; West Germany $32,731.
Iron and steel: Metal: Scrap	208	1	--	All from Japan.
Pig iron, cast iron, related materials	4,147	8,145	--	Greece 7,876; Czechoslovakia 183; West Germany 41.
Ferroalloys, unspecified—kilograms	1	6	--	All from West Germany.
Steel, primary forms[2]	5,634	3,809	--	West Germany 2,272; Italy 644; Spain 543.
Semimanufactures: Bars, rods, angles, shapes, sections—value, thousands	$7,932	$5,665	$1	France $1,916; Belgium-Luxembourg $1,888; United Kingdom $1,299.
Universals, plates, sheets—do	$6,919	$7,769	$1	United Kingdom $2,363; France $1,815; Belgium-Luxembourg $979.
Hoop and strip—do	$622	$411	--	France $104; West Germany $88; Netherlands $78.
Rails and accessories—do	$115	$2	--	All from United Kingdom.
Wire—do	$1,956	$1,098	$3	Italy $366; West Germany $297; United Kingdom $138.
Tubes, pipes, fittings—do	$5,986	$5,551	$357	Italy $1,366; United Kingdom $708; France $609.
Castings and forgings, rough—do	--	$1	--	All from United Kingdom.
Lead: Oxides—value	$231,013	$151,914	--	United Kingdom $113,892; West Germany $18,593; East Germany $14,396.
Metal including alloys: Unwrought	60	(1)	--	All from United Kingdom.
Semimanufactures—value	$34,867	$40,142	$62	United Kingdom $32,759; Netherlands $6,931.
Magnesium: Metal including alloys, all forms—do	$1,717	$943	--	All from West Germany.
Manganese: Oxides—do	$601	$566	--	All from Netherlands.
Mercury—do	$429	$1,932	--	United Kingdom $1,859; Italy $73.
Metalloids: Unspecified—do	$2,163	$1,650	$116	Italy $1,534.
Nickel: Matte and speiss—kilograms	--	200	--	All from United Kingdom.
Metal including alloys: Unwrought—do	250	300	--	All from Canada.
Semimanufactures value, thousands	$6,953	$5,654	(1)	West Germany $3,880; Ireland $1,127; Switzerland $456.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified—troy ounces	(1)	5	--	West Germany 3; Austria 2.
Silver: Metal including alloys, unwrought and partly wrought—do	58,111	39,638	--	United Kingdom 22,570; West Germany 16,767.
Tin: Metal including alloys: Unwrought	4	4	--	All from United Kingdom.
Semimanufactures—value	$530,073	$701,580	(1)	Italy $382,632; United Kingdom $257,055; France $61,095.
Titanium: Ore and concentrate—kilograms	252	--	--	
Oxides—value	$311,590	$478,598	$22,290	United Kingdom $184,273; Italy $133,696; West Germany $121,133.

See footnotes at end of table.

Table 3.—Malta: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Uranium and/or thorium: Metal including alloys, all forms ——value	$5,071	--		
Zinc:				
Oxides ——do——	$53,314	$53,022	--	United Kingdom $22,125; Netherlands $20,702; Norway $4,405.
Blue powder ——kilograms——	10	--		
Metal including alloys:				
Unwrought ——	50	174	--	Belgium-Luxembourg 59; France 50; Netherlands 25.
Semimanufactures ——value——	$63,059	$188,823	--	United Kingdom $116,730; Netherlands $29,660; Norway $21,405.
Other:				
Oxides and hydroxides——do——	$34,300	$40,862	--	United Kingdom $30,040; West Germany $10,580.
Pyrophoric alloys——do——	$5,252	$2,722	$501	United Kingdom $1,234; West Germany $914.
Base metals including alloys, all forms ——do——	$19,314	$10,673	--	United Kingdom $10,156; Italy $517.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc. ——do——	$36,313	$13,137	--	Italy $5,921; West Germany $3,494; United Kingdom $1,874.
Artificial: Corundum——do——	$15,364	$43,651	--	Yugoslavia $23,034; Italy $20,472.
Dust and powder of precious and semi-precious stones including diamond ——do——	$21,742	$31,928	--	All from Ghana.
Grinding and polishing wheels and stones ——do——	$670,490	$556,821	$2,569	Yugoslavia $186,163; West Germany $136,002; Italy $40,777.
Asbestos, crude ——do——	$47,461	$38,673	--	Italy $38,649.
Barite and witherite ——do——	--	$398	--	All from United Kingdom.
Boron materials:				
Crude natural borates ——do——	$5,611	--		
Oxides and acids ——do——	$3,741	$1,609	--	United Kingdom $883; West Germany $333; France $271.
Cement ——	133,686	142,170	NA	NA.
Chalk ——value——	$67,193	$61,735	--	United Kingdom $30,523; France $19,703; Italy $6,562.
Clays and clay products:				
Crude:				
Fire clay ——	14	18	--	All from China.
Unspecified ——	333	330	1	United Kingdom 268; Italy 53; China 4.
Products:				
Nonrefractory value, thousands——	$4,761	$4,241	--	Italy $4,000; United Kingdom $193; Spain $39.
Refractory including nonclay brick value——	$137,952	$105,564	$6,386	United Kingdom $67,563; Italy $22,461; China $4,821.
Cryolite and chiolite ——do——	--	$4,558	--	All from Yugoslavia.
Diamond:				
Gem, not set or strung value, thousands——	r$4,230	$6,201	--	Sierra Leone $2,791; Netherlands $1,790; Angola $591.
Industrial ——do——	$522	$1,827	--	Ghana $1,259; Netherlands $567.
Diatomite and other infusorial earth value——	$17,544	$31,028	--	Spain $15,871; Italy $6,862; United Kingdom $2,741.
Fertilizer materials:				
Crude, unspecified ——	--	1	--	All from United Kingdom.
Manufactured:				
Ammonia ——value——	$38,947	$26,603	--	United Kingdom $23,594; Netherlands $1,691; Sweden $630.
Nitrogenous ——	3,051	887	--	North Korea 500; West Germany 328; United Kingdom 38.
Phosphatic ——	31	21	--	Belgium-Luxembourg 17; United Kingdom 4.
Unspecified and mixed ——	2,136	341	3	West Germany 220; Italy 87; United Kingdom 29.
Graphite, natural ——value——	$20	--		
Gypsum and plaster ——do——	$30,637	$41,624	$3,554	Spain $36,936; United Kingdom $734.
Halogens: Chlorine ——do——	$111,612	$134,533	--	United Kingdom $102,396; West Germany $32,137.
Lime ——	51	130	--	All from Italy.

See footnotes at end of table.

Table 3.—Malta: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Mica:				
Crude including splittings and waste value	$5,306	$2,812	--	West Germany $1,232; United Kingdom $1,196; Norway $364.
Worked including agglomerated splittings do.	$277,361	$121,079	--	West Germany $116,018; Italy $3,365; India $875.
Phosphates, crude kilograms	300	200	--	All from Italy.
Pigments, mineral:				
Natural, crude value	$8,356	--		
Iron oxides and hydroxides, processed do.	$10,993	$14,923	--	Spain $6,130; West Germany $5,289; United Kingdom $3,504.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material do.	$31,995	$12,635	--	Switzerland $10,817; India $689; United Kingdom $584.
Meerschaum, amber, jet do.	$1,714	$408	--	West Germany $349; United Kingdom $59.
Synthetic do.	$2,437	$279	--	Austria $207; France $72.
Salt and brine[3]	r1,528	2,163	--	Tunisia 1,200; Italy 581; United Kingdom 327.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides value	$1,415	$470	--	Czechoslovakia $338; Belgium-Luxembourg $88.
Sodium carbonate, natural and manufactured	47	275	--	West Germany 185; United Kingdom 69; Denmark 20.
Sodium hydroxide value	$239,320	$204,405	--	United Kingdom $70,450; Netherlands $51,798; Italy $41,361.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked value, thousands	$1,760	$1,774	--	Italy $1,671; Greece $89.
Worked value	$95,520	$36,480	--	Italy $27,411; West Germany $5,580; United Kingdom $3,486.
Gravel and crushed rock do.	$855,646	$557,777	--	Italy $554,069; Sweden $3,301.
Limestone other than dimension do.	--	$180	--	All from United Kingdom.
Quartz and quartzite do.	$2,604	$2,443	--	Italy $2,438.
Sand other than metal-bearing	6,966	r1,912	--	Netherlands 970; Italy 400; West Germany 243.
Sulfur:				
Elemental:				
Crude including native and by-product	(1)	2	--	Italy 1; United Kingdom 1.
Colloidal, precipitated, sublimed	170	91	--	Italy 90.
Dioxide value	$25,817	--	--	
Sulfuric acid do.	$41,034	$58,773	$41	Netherlands $54,582; United Kingdom $1,826; Belgium-Luxembourg $1,030.
Talc, steatite, soapstone, pyrophyllite do.	$23,002	$40,098	$5,046	Australia $11,757; Norway $11,210; United Kingdom $7,427.
Other:				
Crude do.	$93	$4,347	--	All from United Kingdom.
Oxides and hydroxides of barium, magnesium, strontium do.	$15,677	$7,961	--	United Kingdom $4,968; Japan $2,993.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value, thousands	$1,275	$2,468	--	Italy $1,168; Finland $552; United Kingdom $119.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	5	2,005	2	West Germany 2,001.
Carbon: Carbon black value	$424,735	$225,659	$17,392	Italy $101,954; West Germany $85,709; Canada $13,653.
Coal:				
Anthracite and bituminous	534	677	--	All from West Germany.
Briquets of anthracite and bituminous coal	82	32	(1)	Australia 23; United Kingdom 9.
Coke and semicoke	160	100	--	All from West Germany.
Hydrogen, helium, rare gases value	$20,201	$13,792	--	Italy $13,604.
Peat including briquets and litter	275	266	--	Netherlands 81; Ireland 58; United Kingdom 57.

See footnotes at end of table.

Table 3.—Malta: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products:				
Mineral jelly and wax[5] 42-gallon barrels	2,694	2,380	--	West Germany 1,717; Hungary 629.
Lubricants[6] ---------- do	26,064	19,236	131	Netherlands 8,364; United Kingdom 3,853; Belgium-Luxembourg 3,852.
Nonlubricating oils ---------- value	$88,049	$68,188	--	United Kingdom $64,281; France $3,398.
Bitumen and other residues 42-gallon barrels	13,692	29	--	All from West Germany.
Bituminous mixtures value, thousands	$1,489	$108	$10	United Kingdom $60; France $17; Italy $10.
Tars and other crude chemicals derived from coal, gas, and petroleum[7] ------	r248	270	5	United Kingdom 248; West Germany 14.

rRevised. NA Not available.
[1]Quantity less than 1/2 unit.
[2]Excludes quantity valued at $3,436 in 1980 and $666 in 1981.
[3]Excludes quantity valued at $115,689 in 1980 and $59,341 in 1981.
[4]Excludes quantity valued at $253.
[5]Excludes quantity valued at $5,074 in 1980 and $14,401 in 1981.
[6]Excludes quantity valued at $387,748 in 1980 and $285,843 in 1981.
[7]Excludes quantity valued at $8,288 in 1980 and $9,467 in 1981.

The Mineral Industry of Mauritania

By Thomas O. Glover[1]

The mining industry has performed a central role in the Mauritanian economy since 1963, when iron ore mining began. Exports of iron ore regularly account for 80% of all exports. The Government derived between one-quarter and one-third of its revenue from the mining industry, which employed one-quarter of the wage and salaried work force.

As a result of its dependence on iron ore exports, the economy has suffered a loss of foreign exchange in recent years from the weakness of the iron ore market.

The El-Rhein Mine, a part of the Guelbs deposit, was partially developed in 1982, with production of iron ore due to commence in 1984-85. The Akjoujt copper mine, closed in 1978, was reopened. An oil refinery built at Nouadhibou in 1977 was refurbished and commenced operation.

The International Bank for Reconstruction and Development (World Bank) and its affiliate, the International Development Association (IDA), approved a $4.6 million IDA credit that will assist the Ministry of Planning in formulating and monitoring macroeconomic policy and reviewing and implementing the fourth 5-year National Investment Plan (1981-85). The project will be completed in 1986. Mauritania was heavily dependent on its ore exports and had allocated 33% of projected investment expenditures in the 1981-85 plan period to the opening of the Guelbs iron ore deposit.

PRODUCTION AND TRADE

Production of Mauritania's major mineral commodity, iron ore, continued to decline for the third year in succession, owing mostly to poor market conditions. Iron ore output was down approximately 6% from that of 1981 but was still well above the low of 7 tons in 1978, when the conflict with Western Sahara was at its peak. The refurbished oil refinery at Nouadhibou received its first shipment of Algerian crude oil in July 1982 and began marketing its first petroleum products from the refinery in October 1982.

Iron ore exports from the Government-owned Société Nationale Industrielle et Minière (SNIM) mines in Zouirat in 1982 totaled 7.65 million tons. The three major countries receiving Mauritanian iron ore were Belgium, France, and Italy.

Table 1.—Mauritania: Production of mineral commodities[1]

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Cement, hydraulic ____ metric tons	--	--	--	55,000	65,000
Copper, mine output, metal content ____ do ____	1,773	--	--	--	--
Gold ____ troy ounces	8,000	--	--	--	--
Gypsum ____ metric tons	13,438	16,051	12,025	[3]1,732	5,000
Iron and steel:					
Iron ore:					
Gross weight ____ thousand metric tons	6,934	9,373	8,936	8,704	7,000
Iron content[e] ____ do ____	4,299	5,811	5,332	5,243	4,550
Crude steel ____ metric tons	--	6,200	5,098	--	--
Steel, semimanufactures ____ do ____	--	--	3,995	4,400	3,000
Rare-earth metals: Monazite concentrate, gross weight[e] ____ do ____	100	100	--	--	--
Silver ____ troy ounces	19,000	--	--	--	--

[e]Estimated. [p]Preliminary.
[1]Table includes data available through June 14, 1983.
[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, stone, and sand and gravel) and salt presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]Gypsum mine only operated January through March 1981.

COMMODITY REVIEW

METALS

Copper.—On May 25, 1982, the Akjoujt copper mine was reopened. Until 1978, the mine was worked by the Société Minière de Mauritanie but was forced to shut down when the world market price for copper fell. The mine was reopened by the Société Arabe Minière D'Inchiri with a capital expenditure of $72 million. Mauritania funded 34% of the capital expenditures with the Arab Mining Co., Jordan, Iraq, and Libya funding 66%. The mine was expected to produce 105,300 tons of concentrate per year yielding a 23% copper content by 1985. The Akjoujt deposit had been estimated to contain 20 million tons of ore reserves grading 2.25% copper. The processing of 2.5 million tons of tailings from previous copper operations could net 362,500 ounces of gold.

Iron Ore.—The three open pit mines at the Kedia d'Idjill deposit, Tazadit, F'Derik, and Rouessa, were to be phased out by 1990 and will be replaced by two open pit mines in the Guelbs deposit.

Work had begun on the first phase of the $480 million El-Rhein Mine development project. The deposit contained at least 250 million tons of magnetite ore grading 37% iron. Starting in 1984, approximately 13.8 million tons per year were to be mined at the El-Rhein Mine. The ore was to be crushed at the minesite and run through a dry magnetic separation process to produce 6 million tons per year of 65% iron concentrate. Output was to be in the form of 1.2 million tons per year of magnetic sinter-plant feed, 2.64 million tons per year of oxidized sinter feed, and 2.16 million tons per year of fine-grained magnetic concentrate suitable for later super enrichment.

Work on the Oum Arwagen Mine was to follow the startup of production of the El-Rhein Mine. The mine was to be developed at a cost of $525 million. Production of concentrate from the mine was to be in excess of 6 million tons per year. Plans for the Guelbs project allowed for the possibility of raising total output in the future to 24 million tons per year of iron ore. SNIM had received letters of credit covering more than one-half the output from the El-Rhein Mine.

There are plans to build an iron ore pelletizing plant at Nouadhibou, which would have a capacity of 2 million tons per year. The plant would be built by the Société Arabe des Industries Metalliques, which is jointly owned by SNIM and Kuwait interests.

NONMETALS

Gypsum.—Since 1973, SNIM has mined gypsum at Sebkha de Ndrhamcha, near Nouakchott, exporting the entire production to Senegal for use in its cement plant at Rufisque. Mauritania possessed an estimated 1 billion tons of 98% pure gypsum. To date, approximately 100,000 tons of gypsum have been mined since startup of operations in October 1975.

Phosphate.—Phosphate occurrences in the Aleg-Boghe-Kaedi area, on the southern border, were being studied by SNIM and France's Bureau de Recherches Géologiques et Minières to determine the extent of the deposits and whether they were economically exploitable to meet domestic needs. Reserves were estimated at 30 million to 40 million tons and might be worked at a rate of 500,000 tons per year.

MINERAL FUELS

Petroleum.—National Refining Industries of Mauritania began operations in July 1982. The plant, built in 1977 at a cost of $90 million, had never been able to operate. The plant had been designed for light Algerian crude oil, and the country was unable to obtain this type of oil. Following restoration to full capacity of 23,000 barrels of crude oil per day, the plant will employ 250 to 300 persons and will have expected sales of over $287 million[2] per year.

Uranium.—Mauritania has signed an agreement with Iraq to participate in an exploration program in northern Mauritania for uranium.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Mauritanian ouguiyas (UM) to U.S. dollars at the rate of UM52.153=US$1.00.

The Mineral Industry of Mexico

By Orlando Martino[1]

After a period of remarkable growth, Mexico's economy in 1982 was in severe crisis. Its difficult situation was characterized by a large foreign debt, several sizable devaluations of the peso, a stagnant economy, inflation of almost 100%, rising unemployment, and a sharp reduction in new private sector investment. During 1978-81, Mexico had one of the highest growth rates in the world—an average increase of 8.4% per year. In 1982, the economy experienced no growth; in fact, output fell slightly by 0.2% to an estimated $162 billion at current prices.[2]

At yearend, Mexico's total foreign debt had increased to $84.3 billion, comprised of $62.3 billion for the Government sector and $22.0 billion held privately. Of total debt, Petróleos Mexicanos (PEMEX), the state oil company, owed $20 billion to foreign lenders. A smaller but significant amount of foreign debt was held by a number of Mexican mining companies with Government and private equity participation. To assist Mexico with its international financial difficulties, in August, the United States provided an aid package that included $1 billion advance payment for oil deliveries to the U.S. Strategic Petroleum Reserve.

Foreign exchange controls applied during the year made it difficult for mineral companies to import equipment and materials for mining operations. Consequently, new investment plans were deferred or current expansion projects delayed. The substantial depreciation of the overvalued peso, on the other hand, benefited mineral companies that earned dollars and other hard currencies from mineral exports while operating costs were incurred in local currency. Exporting companies with limited overseas loans were especially advantaged by the several peso devaluations. But these benefits were expected to be short lived as inflation pushes local costs upward.

A positive note in Mexico's depressed situation in 1982 was PEMEX's continued success in expanding the country's crude oil and natural gas output to historic levels. This PEMEX performance confirmed Mexico's position as the world's fourth largest oil producer after the U.S.S.R., the United States, and Saudi Arabia. Oil exports were also at a historic level, as Mexico became the most important foreign oil supplier to the United States.

Output by Mexico's nonfuel mineral industry declined, and earnings from total mineral exports fell because of lower world prices for the majority of mineral products. Because of the key role of silver, the large drop in average price, combined with reduced output, had a serious impact on foreign earnings. Despite this negative picture, Mexico succeeded in achieving record production levels in a number of metallic and nonmetallic products. Mexico continued as a major world producer of silver, fluorspar, strontium minerals, arsenic, natural graphite, antimony, and bismuth, and a significant producer of cadmium, lead, zinc, selenium, natural sodium sulfate, and sulfur. Mexico was the world's largest exporter of salt. Mexico made further progress in its long-term goal of adding value to its mineral output before export with the start-up of a new zinc refinery.

Government Policies and Programs.—The new administration that began its 6-year term in December announced an austerity program for a 24-month period. Exchange controls imposed had an impact on foreign loan servicing, overseas profits

flow, and imports needed for investment projects. To decrease the dependency on oil exports, the Government was studying means to increase exports of agricultural and mineral commodities such as silver, copper, lead, zinc, and others. At yearend, the Government was considering legislation to increase the oil production ceiling from 2.75 million to 3 million barrels per day, but the increase would be linked to domestic demand rather than export prospects.

The Government was considering ways to encourage new foreign investment by a relaxation of the equity participation rules. However, it was felt that these equity changes would exclude the sensitive priority industries of mining and petrochemicals.

In September, the Government nationalized 53 private and mixed capital banks in Mexico. The banks held shares in over 300 companies including those with joint ventures with foreign companies. Since the banks also held shares in mineral companies, nationalization was expected to alter the pattern of Government equity participation in the mineral sector.

The Comisión de Fomento Minero (Fomento Minero), a decentralized Government agency, continued its program of credit and technical assistance to small and medium miners. Mining credit has expanded from the equivalent of $3.7 million in 1971 to $25.4 million in 1979. Fomento Minero operated a number of regional ore beneficiation plants to serve the small and medium miners.

The Consejo de Recursos Minerales (CRM) was involved in an intensive mineral exploration program directed toward minerals essential to Mexico's industrial development plan for 1980-90 but in which the country is deficient. Annual expenditures for nonfuel mineral exploration exceeded $100 million annually in the early 1980's, of which the Government expended 55%, and private mineral companies, 45%. Of this total, CRM was responsible for 37%. Since 1975, CRM's intensified efforts have resulted in major significant new mineral discoveries or increased proven reserves involving copper, iron ore, phosphate rock, and coal. Less significant were the new reserves identified of zinc, sulfur, limestone, and kaolin.

Under the country's National Plan for Industrial Development, Nacional Financiera completed a monograph on the future demand for capital goods by Mexico's mineral industry.[3] It was estimated that the demand for mining equipment and machinery, not including metallurgical plants, for the period 1980-2000 would require $11 billion at 1982 prices. This study was prepared with the collaboration of Fomento Minero, the Cámara Minera de México, and numerous mining companies. Currently, Mexico imports about 70% of its needs for mining equipment.

The new administration was preparing a $2.3 billion investment plan to improve Mexico's roads, railways, seaports, airports, and telecommunications facilities. Of this amount, $1 billion will be allocated to rehabilitate the antiquated rail system that is used to transport a good part of mineral output. The roadbuilding program will include construction of new feeder roads in rural and remote areas where many mining operations are located. The $120 million allocated for seaport development will concentrate on the country's nine largest ports. PEMEX was expanding handling capacity at the Gulf Port of Pajaritos, Mexico's principal oil port, from 900,000 to 1.4 million barrels per day. Storage capacity at Pajaritos will be expanded to 2.6 million barrels.

Despite Mexico's economic difficulties, it was expected that Mexico would extend the San José Agreement with Venezuela for facilitating oil imports by certain countries in Central America and the Caribbean.

PRODUCTION

Despite the country's economic recession, historic highs were achieved in the output of copper, iron ore, ferroalloys, molybdenum, phosphate rock, salt, crude oil, and natural gas. Although industrial output overall was depressed, the fertilizer industry grew by 27% over that of 1981 because of the opening of new plants during the year. The record output level of copper and phosphate rock resulted from increased output of the new mines of La Caridad and San Juan de la Costa, respectively.

Except for the commodities noted above, the level of mineral production was mostly flat or lower relative to 1981. Decreased output was notable in antimony, bismuth, lead, manganese, and crude steel. Among the nonmetallic minerals, output was lower for fluorspar, gypsum, and sulfur.

The Banco de México reported a slow-

down in the rate of employment in the mineral sector from a 9.6% increase in 1981 to a 6.5% increase in 1982.[4] According to the latest data available from the CRM for 1980, out of a total of 8.5 million employed in industry, 2.2% of the total or 182,000 workers were in the mineral sector.[5]

Table 1.—Mexico: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal, primary	43,092	43,195	42,601	43,237	43,300
Antimony:[3]					
Mine output, metal content	2,457	2,872	2,176	1,800	1,565
Metal (in mixed bars and refined)	490	557	422	354	253
Arsenic, white[4]	6,245	6,537	6,332	6,517	4,740
Bismuth[5]	978	754	770	656	606
Cadmium:					
Mine output, metal content	1,894	1,778	1,791	1,433	1,444
Metal, refined	897	830	778	590	607
Copper:					
Mine output, metal content	87,186	107,109	175,399	230,466	239,091
Metal:					
Blister (primary only)	86,978	83,857	85,610	69,199	77,373
Refined:					
Primary	69,990	71,781	74,610	61,301	61,424
Secondary[e]	5,000	10,000	11,000	10,000	14,000
Total[e]	74,990	81,781	85,610	71,301	75,424
Gold:					
Mine output, metal content—troy ounces	202,003	190,364	195,991	203,160	196,248
Metal, refined—do	190,718	187,439	185,863	176,861	175,189
Iron and steel:					
Iron ore:					
Gross weight[6]—thousand tons	5,334	6,061	7,631	8,020	8,155
Metal content—do	3,556	4,041	5,087	5,293	5,382
Metal:					
Pig iron—do	3,509	3,520	3,639	3,767	3,598
Sponge iron—do	1,628	1,507	1,636	1,686	1,505
Total—do	5,137	5,027	5,275	5,453	5,103
Ferroalloys:					
Ferromanganese—do	107	r123	122	131	135
Silicomanganese—do	34	r31	31	26	32
Ferrosilicon—do	25	r24	27	23	25
Ferrochromium—do	4	5	--	3	6
Other—do	1	r1	1	2	1
Total—do	171	r184	181	185	199
Steel, crude—do	6,776	7,117	7,156	7,605	7,048
Semimanufactures—do	5,253	5,844	6,220	6,395	NA
Lead:					
Mine output, metal content	170,593	173,455	145,549	157,384	145,844
Metal:					
Smelter:					
Primary	166,098	172,988	144,968	156,677	145,348
Secondary (refined)[e]	49,300	50,000	r44,000	r38,000	34,000
Total	215,398	222,988	188,968	194,677	179,348
Refined:					
Primary (including lead content of antimonial lead)	159,342	167,149	140,294	150,350	137,238
Secondary[e]	49,300	50,000	r44,000	r38,000	34,000
Total	208,642	217,149	184,294	188,350	171,238
Manganese ore:					
Gross weight[7]	523,167	492,664	447,128	578,300	509,000
Metal content	188,340	177,359	160,966	208,193	183,120
Mercury, mine output, metal content 76-pound flasks	2,205	1,973	4,206	6,962	6,500
Molybdenum, mine output, metal content	11	48	74	451	5,190
Nickel, mine output, metal content	22	1	--	--	--
Selenium, elemental	80	75	46	12	29
Silver:					
Mine output, metal content thousand troy ounces	50,779	49,408	47,344	53,204	49,841
Metallurgical products, metal content—do	48,903	48,601	45,410	50,151	46,784

See footnotes at end of table.

Table 1.—Mexico: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Tin:					
Mine output, metal content	73	23	20	20	20
Metal, smelter, primary[8]	1,000	1,268	1,382	866	800
Tungsten, mine output, metal content	234	252	266	263	99
Zinc:					
Mine output, metal content	244,892	245,477	238,231	211,629	231,910
Metal, smelter, primary	173,094	161,723	143,868	126,537	126,953
NONMETALS					
Asbestos	--	--	--	--	200
Barite	231,485	151,162	269,322	317,738	323,753
Cement, hydraulic thousand tons	14,056	15,178	16,260	18,066	19,298
Clays:					
Bentonite	140,325	169,848	176,028	220,454	200,000
Fuller's earth	40,615	48,820	56,858	65,378	65,000
Kaolin	179,500	76,994	271,041	207,824	186,300
Common	114,000	149,000	153,472	155,000	150,000
Diatomite	40,862	43,606	56,352	56,600	57,000
Feldspar	109,808	110,869	117,214	123,801	120,000
Fluorspar, all grades thousand tons	960	875	916	1,116	725
Graphite, natural, all grades	52,264	50,880	44,854	42,294	34,460
Gypsum and anhydrite, crude (yeso)	1,757,870	2,021,006	2,170,669	2,390,431	1,530,564
Lime thousand tons	[e]4,445	4,579	4,350	4,500	4,000
Magnesium compounds, (magnesia)[9]	76,035	81,620	86,987	[e]85,000	85,000
Mica, all grades	401	243	331	400	400
Nitrogen: N content of ammonia[10]	1,303,914	1,358,800	1,547,971	1,794,555	2,029,600
Perlite	24,517	41,988	44,379	56,731	NA
Phosphate rock	322,076	[r]274,428	396,646	503,252	512,096
Salt, all types thousand tons	5,635	6,169	6,575	7,953	8,000
Sodium compounds:					
Soda ash (sodium carbonate) do	414	420	406	400	450
Sodium sulfates, natural (bloedite)	330,804	361,123	372,092	[r e]415,000	425,000
Stone, sand and gravel:					
Calcite, common	19,753	109,138	226,882	246,040	NA
Dolomite	249,244	282,342	378,316	371,027	353,265
Limestone[11] thousand tons	22,565	24,086	31,173	39,046	NA
Marble	144,554	155,578	164,392	171,152	NA
Quartz, quartzite, glass sand (silica)	532,209	537,299	892,963	1,009,330	828,187
Strontium minerals (celestite)	34,224	39,519	40,761	41,344	35,000
Sulfur, elemental:					
Frasch process thousand tons	1,650	1,773	1,700	1,652	1,391
Byproduct:					
Of metallurgy[e] do	100	100	[r e]115	100	100
Of natural gas do	168	252	402	426	425
Total do	1,918	2,125	2,217	2,178	1,916
Talc	2,639	7,835	10,088	11,169	10,000
Wollastonite	10,956	11,892	14,400	14,602	NA
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	228,834	270,082	280,039	335,906	327,618
Coal, bituminous (run of the mine) thousand tons	6,756	7,357	7,010	8,086	7,616
Coke:					
Metallurgical do	2,808	2,974	2,845	3,031	2,433
Imperial do	11	13	16	12	9
Breeze do	87	65	91	90	8
Total do	2,906	3,052	2,952	3,133	2,450
Gas, natural:					
Gross million cubic feet	934,911	1,064,559	1,298,581	1,482,196	1,549,921
Marketable do	744,891	914,873	1,129,288	1,214,240	1,279,398
Natural gas liquids:					
Field condensate thousand 42-gallon barrels	1,259	3,597	139	309	654
Other do	42,689	53,644	70,791	88,145	NA
Petroleum and refinery products:					
Crude do	441,348	533,329	708,454	843,933	1,002,430
Refinery products:					
Gasoline:					
Aviation do	585	638	622	544	653
Other do	88,643	102,888	118,855	130,559	126,009
Jet fuel do	7,390	9,154	10,089	10,558	11,117
Kerosine do	13,840	14,698	15,164	15,047	16,541
Distillate fuel oil (diesel) do	72,461	78,584	89,392	98,530	85,605
Residual fuel oil do	88,963	86,684	112,903	126,665	128,022
Lubricants do	2,931	2,836	2,860	3,512	2,853

See footnotes at end of table.

Table 1.—Mexico: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Other:					
Liquefied petroleum gas thousand 42-gallon barrels	27,024	33,058	43,829	49,595	43,984
Asphalt do	4,819	5,390	6,155	6,651	7,288
Unspecified do	6,138	7,690	6,656	7,533	6,427
Refinery fuel and losses do	13,834	16,647	18,478	21,856	14,990
Total do	326,628	358,267	425,003	471,050	443,489

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 31, 1983.

[2]In addition to the commodities listed, pumice and additional types of crude construction materials are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Sb content of ores for export plus Sb content of antimonial lead and other smelter products produced.

[4]Calculated white As equivalent of metallic As content of products reported.

[5]Bi content of refined metal, bullion, and alloys produced indigenously, plus recoverable Bi content of ores and concentrates exported for processing.

[6]Calculated from reported Fe content on the basis of concentrate and pellets containing 66% iron.

[7]Calculated from reported Mn content of mine production on the basis of ore and nodules averaging 36% manganese.

[8]Estimates by the International Tin Council.

[9]Reported erroneously as magnesite in previous editions of this chapter.

[10]Beginning in 1981, Petróleos Mexicanos (PEMEX) initiated production of liquid nitrogen, which in that year amounted to 29,540 tons; in 1982, it was 39,009 tons.

[11]Excluding that for cement production.

TRADE

During 1982, Mexico sought to increase exports as a means of rebounding from the recession and to take advantage of the increased competitive position of Mexican products caused by the peso devaluations. Considering the economic recession in Mexico and worldwide, the country succeeded in expanding total exports by 8.4% over those of 1981 to $21 billion. This increase was due primarily to the 17% increase over the 1981 level in the value of crude oil exports, while the value of nonoil exports declined by almost 30%, compared with that of 1981. Crude oil exports generated a foreign income of $15.6 billion despite the almost 14% decrease from that of 1981 in the average price of oil. The volume of crude oil shipments expanded by 36% over that of 1981 from an annual total of 401 million to 545 million barrels. On the other hand, the value of natural gas exports to the United States declined 9% below that of 1981 to $476 million.

The substantial drop in the value of nonfuel mineral exports resulted primarily from the decline in silver exports that dropped 27% below 1981 levels. Normally silver accounts for about 50% of Mexico's nonfuel mineral exports. Exports of gold and silver were valued at $386 million compared with $531 million in 1981. Exports of copper concentrate to the United States increased notably since Mexico did not have smelter and refinery capacity to handle its expanded mine output. Because of reduced domestic demand, steel exports increased to $112 million, compared with $64 million in 1981. The dominance of mineral exports in Mexico's international trade is shown below:

	1980	1981	1982
Total Mexican exports value, millions	$15,308	$19,379	$21,006
Crude oil exports do	$9,449	$13,305	$15,623
Crude oil share percent	61.7	68.7	74.4
Mining, metallurgical exports value, millions	$1,347	$1,256	$887
Mining, metallurgical share percent	8.8	6.5	4.2

Because of the economic recession and restrictions on the availability of foreign exchange, total imports contracted 40% below those of 1981 to $14.4 billion, giving Mexico a substantial surplus of $6.6 billion in its trade balance. Of the total, $9.1 billion represented purchases by the private sector. Imports of steel products fell to $1.1 billion compared with $3.1 billion in 1981.

Imports for the mining, oil, and natural gas sectors as a group declined 48% compared with those of 1981. Overseas purchases, in particular by the nonferrous mineral sector for ore extraction and beneficiation purposes, fell by 65% compared with those of 1981.

The United States continued as the most important market for Mexico's mineral exports. About 50% of crude oil exports went to the United States, and Mexico became the leading foreign oil supplier to the United States. For the first time in many years, the United States ran a trade deficit of $3.7 billion with Mexico. Mexico exported $15.5 billion to the United States, compared with $13.8 billion in 1981, and imported $11.8 billion from the United States, compared with $17.8 billion in 1981. Compared with that of 1981, the U.S. share of Mexican exports decreased from 54.2% to 53.4% and the U.S. share of Mexican imports decreased from 66.3% to 62.2%. Mexico was the third most important trading partner of the United States after Canada and Japan.

Table 2.—Mexico: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980[2]	1981[3]	1982[3]
METALS			
Bismuth: Ore and concentrate	r213	211	149
Copper: Ore and concentrate	r112,907	447,106	409,842
Lead:			
Ore and concentrate	r6,719	4,713	11,381
Metal including alloys, all forms	r55	39	41
Manganese: Ore and concentrate	r133,919	199,469	167,761
Mercury 76-pound flasks	r6	7	166
Tungsten: Ore and concentrate	r333	346	580
Zinc:			
Ore and concentrate	r141,139	154,395	157,239
Metal including alloys, all forms thousand metric tons	60	22	14
NONMETALS			
Cement	233	101	245
Feldspar, fluorspar, related materials: Fluorspar	722,904	604,924	347,615
Gypsum and plaster	r908,674	1,563,274	1,329,911
Salt and brine	r5,725	4,390	4,688
Sulfur: Elemental	r1,050,401	1,199,872	899,528
MINERAL FUELS AND RELATED MATERIALS			
Gas, natural billion cubic feet	r106,077	109,442	98,792
Petroleum: Crude thousand 42-gallon barrels	r302,988	400,777	544,614

rRevised.

[1]The quantities for 1981 and 1982 listed in this table reflect preliminary data that do not include information related to destinations.

[2]Source: Informe Anual 1981, Banco de México, Delegación Cuauhtemoc, 06059. Mexico, D.F., 1982.

[3]Source: Informe Anual 1982, Banco de México, Delegación Cuauhtemoc, 06059. Mexico, D.F., 1983.

Table 3.—Mexico: Copper exports to the United States

(Metric tons unless otherwise specified)

Year	Ore, concentrate	Matte	Blister	Refined	Scrap	Total
1976	4	--	2,852	385	4,996	8,237
1977	--	--	4,235	5,740	3,732	13,707
1978	129	--	1,709	178	3,802	5,818
1979	186	5	3,185	315	4,807	8,498
1980	22	--	927	2,611	4,700	8,260
1981	10,897	362	3,387	4,368	4,809	23,823
1982	52,449	--	4,161	2,822	5,030	64,462
Total	63,687	367	20,456	16,419	31,876	132,805
Share of total for period percent	48.0	0.3	15.4	12.3	24.0	100.0

Source: U.S. Customs.

Table 4.—Mexico: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity		1980[2]	1981[3]	1982[3]
METALS				
Aluminum: Ore and concentrate		r90,098	63,938	43,254
Iron and steel: Iron ore and concentrate		r381,418	446,622	1,074
Tin: Ore and concentrate		r4,981	6,416	969
NONMETALS				
Asbestos, crude		r79,123	75,728	55,727
Clays and clay products: Crude, kaolin		r737,359	626,241	445,306
Diamond: Industrial	value, thousands	NA	$20	$13
Talc, steatite, soapstone, pyrophyllite		r5,406	6,362	6,223
MINERAL FUELS AND RELATED MATERIALS				
Gas, natural	million cubic feet	3,426,675	3,505,985	1,879,115
Petroleum: Crude	thousand 42-gallon barrels	502	4,000	5,000

rRevised. NA Not available.

[1]The quantities for 1981 and 1982 listed in this table reflect preliminary data that do not include information related to sources.

[2]Source: Informe Anual 1981, Banco de México, Delegación Cuauhtemoc, 06059. Mexico, D.F., 1982.

[3]Source: Informe Anual 1982, Banco de México, Delegación Cuauhtemoc, 06059. Mexico, D.F., 1983.

COMMODITY REVIEW

METALS

Aluminum.—Mexico planned to increase aluminum productive capacity, with the objective of decreasing dependency on imports from 52% in 1980 to 17% in 1985. In the past, Mexico's aluminum production has been limited by the lack of electrical energy and high operating costs. New projects brought onstream by the Comisión Federal de Electricidad (CFE) now give the country a comparative advantage. Mexico's demand for ingot aluminum has grown significantly during the last decade—from 55,136 tons in 1973 to 105,641 tons in 1980. In 1982, domestic production of ingot covered only 40% of total demand.

Copper.—Since Mexico's installed smelter and refinery capacity did not match its mine capacity, an increased amount of copper concentrate became available for export. Certain U.S. copper producers expressed concern over the increase of copper imports from Mexico during the current depression of the U.S. copper industry. Copper exports to the United States, primarily ore and concentrate, reached a record level of almost 64,500 tons, almost triple 1981 exports. The Mexican copper exports represented a very small part of the total U.S. copper market. Mexico's copper consumption fell to 87,600 tons compared with 131,000 tons in 1981, while copper imports fell to 27,000 tons from 78,000 tons for the same period.[6]

Mexico's high level of mine production reflected expanded output from the new La Caridad Mine, the country's chief copper producer operated by Mexicana de Cobre S.A., which had its third full year of operation. Mexico was in the process of increasing its smelter capacity, currently at 120,000 tons of blister copper per year. The Cía. Minera de Cananea was expanding its rebuilt smelter by 55,000 tons to 125,000 tons per year by 1984, and Caridad was building a new 180,000-ton-per-year smelter near Nacozari, Sonora State, which was scheduled for completion in late 1983 or early 1984. These projects would give Mexico a total smelter capacity of 355,000 tons of copper per year, about equal to its mine-mill capacity. Considering that the Cananea mining district is about 40 miles south of Nogales and Douglas in Arizona, concern was voiced over how air quality would be impacted by sulfur dioxide emissions from the expanded smelter operations.

Mexico had only one copper refinery rated at 120,000 tons per year, operated in Mexico City by Cobre de México S.A. This company was expanding its annual capacity to 150,000 tons. La Caridad decided to build a new 180,000-ton-per-year refinery near the Pacific coast Port of Guaymas. In late 1982, Mexicana de Cobre awarded a $113 million contract to Marubeni Corp. of Japan to design, construct, and supply equipment for the Guaymas electrolytic refinery. Input for the refinery would be supplied from La Caridad's new smelter. These two projects would give Mexico a total refinery capacity of 330,000 tons and provide some capability

of exporting refined copper instead of copper concentrate.

Gold.—Mexico's importance as a gold producer has been diminishing for several decades. In 1980, gold accounted for almost 5% of the value of all nonfuel minerals. Gold has been produced chiefly as a byproduct of lead, zinc, and copper mining. The Pinzón Dorado Mine in Guerrero State represents the only mine worked for gold exclusively with an annual output of about 32,000 troy ounces. In 1981, Industrias Peñoles S.A. de C.V. (PENOLES) and its affiliated companies produced 130,700 troy ounces of gold or about 64% of national output. The leading producing States of Guanajuato, Sonora (Cananea), Durango, Chihuahua, and Zacatecas accounted for 78% of total output.

Mexico was a major world producer of official gold coins, ranking third after the Republic of South Africa and the United Kingdom. For this purpose, it was necessary to import gold, mostly from the United States and the United Kingdom. Coin production in 1980 consumed 740,000 troy ounces of gold. Mexico was the largest industrial user of gold in Latin America. The Government early in 1981 changed a restriction prohibiting the sale of gold abroad in order to stimulate increased investment in gold mining.

Iron Ore.—Production of iron ore by the country's steel companies reached a record high in 1982 of almost 8.2 million tons, capping a long period of steady growth. Although Mexico has modest reserves of iron ore, they have been adequate to meet domestic requirements. Exploration for iron ore has been an important part of the program of the CRM, which has identified 453 million tons of iron ore reserves with an average grade of 54%.

Altos Hornos de México S.A., a subsidiary steel company of State-owned Siderúrgica Mexicana (SIDERMEX), was nearing completion of the ore concentrator at its La Perla iron ore mine. La Perla Mine is located on the Chihuahua-Coahuila border and will be connected together with the Hercules Mine operated by Fundidora de Monterrey S.A. (FMSA) by a 379-kilometer slurry pipeline to a new pellet plant at Monclova, Coahuila. At yearend, the slurry pipeline with a capacity of 4.5 million tons per year was nearing completion and was expected to be operating in 1983. The pipeline will receive 1.5 million tons of ore from La Perla Mine and 3.0 million tons from the Hercules Mine. Since the pellet plant at Monclova will utilize only 3 million tons, the balance of 1.5 million tons will be shipped by rail to the FMSA pellet plant at Monterrey.

In Michoacán, the third subsidiary of SIDERMEX, Siderúrgica Lázaro Cárdenas Las Truchas S.A. (SICARTSA), was expanding its capacity for ore concentration and pelletization by 3 million tons per year to an annual capacity of 4.5 million tons. The iron ore mines in the Las Truchas area, El Volcán and El Mango, with hematite and magnetite-type iron ore, were being expanded to meet SICARTSA's second-phase steel plan requirements. Dravo Corp. was awarded a $26 million contract for the design, engineering, procurement, and construction management of the SICARTSA pellet plant. The plant, scheduled for completion in 1983, will produce 3 million tons per year of direct-reduction-quality iron ore pellets.

Iron and Steel.—After a decade of strong growth with an average increase of 7% per year, Mexico's steel output declined in 1982 for the first time. Steel imports have risen rapidly since 1970 when only 242,000 tons were imported compared with the 3.1 million imported in 1981. The United States, Japan, and the Federal Republic of Germany provided two-thirds of these steel imports, which required $2.2 billion in foreign exchange or almost 10% of the value of Mexico's total 1981 imports. Mexico's apparent consumption of steel in 1981 was 12.5 million tons.

Reduced domestic demand for steel, chiefly by the oil and automobile industries, forced the steel companies to seek overseas markets in 1982. The large devaluation of the Mexican peso also made the country's steel products very competitive. By yearend, SICARTSA exported, for the first time since startup 6 years ago, 135,000 tons of finished products. Because of the company's location on the Pacific coast and the availability of excellent port facilities, Japan and China were expected to provide growth markets for Mexican steel exports.

The country's large debt burden and economic recession were expected to moderate Mexico's ambitious drive toward self-sufficiency in steel. SICARTSA was involved in implementing phase 2 of its long-range, four-phase program to produce 10 million tons of steel. By yearend, SICARTSA's phase 2 project advanced as follows: mine expansion, 52% completed; ore concentrator engineering, 6%; pellet plant,

29%; direct-reduction plant, 70%; and steel plant engineering, 7%.

Mexico's largest private steel company, Hojalata y Lámina S.A. (HYLSA), was involved in a conversion of a second plant at Monterrey rated at 500,000 tons per year to the HyL III process scheduled for completion during the summer. HYLSA completed engineering for a new 750,000-ton-per-year plant using the HyL III process also at Monterrey. The other private steelmaker, Tubos de Acero de México S.A. (TAMSA), Mexico's only producer of seamless steel pipe, was engaged in a major effort to increase seamless pipe output from 300,000 tons per year to 650,000 tons per year to meet increased demand from PEMEX. By yearend, TAMSA increased shipments to PEMEX by 120,000 tons as a result of its first phase expansion.

Lead and Zinc.—As the world's sixth largest zinc producer, and the second leading producer in Latin America after Peru, Mexico benefited from its position as producer of the world's lowest cost zinc. About 20 of the world's 40 lowest cost zinc mines are located in Mexico. The favorable situation was attributable mostly to low wage costs and high values of gold and silver byproducts. Mexico accounted for 31% of total U.S. zinc concentrate imports. The joint holding company, México Desarrollo Industrial Minera S.A. (MEDIMSA), 34% owned by ASARCO Incorporated, was the largest producer of lead and zinc in Mexico, operating 11 mining units and 5 processing plants. The newest plant began operations in October. It is a 113,000-ton-per-year, $175 million electrolytic zinc refinery located in San Luis Potosí, which will be operated by the subsidiary company, Industria Minera México S.A. (IMMSA). MEDIMSA's output of lead dropped 31% below that of 1981 to 59,100 tons and zinc was flat at 128,000 tons.

The new Real de Ángeles silver mine, which started up in mid-1982, will produce at full capacity 31,000 tons per year of byproduct lead and 26,000 tons of zinc per year. This represents about 18% and 14% of national output, respectively.

In 1980, Mexico's apparent consumption was 96,200 tons of lead and 88,900 tons of zinc, representing 66% and 37%, respectively, of total mine output. In 1980, exports of lead and zinc accounted for 5% and 8%, respectively, of the total value of Mexico's nonfuel mineral exports.

Manganese.—Latin America's largest producer of ferroalloys, Cía. Minera Autlán S.A. de C.V., developed long-range plans for possible doubling of both mine and oxide nodule output. Under consideration was expansion of underground production from the existing Tetzintla Mine and development of a new open pit mine at Naopa, both in the Molango district of Hidalgo State.

In 1981, Autlán mined 734,600 tons of ore, a 21% increase over 1980 output, as the company's underground production rose to equal that from its open pit operations. Autlán's production of oxide nodules from carbonate ore was 471,140 tons in 1981, a 38% increase over that of 1980. The expansion program for the Molango nodule unit was completed by yearend 1981, increasing capacity from 425,000 to 525,000 tons per year of nodules. Autlán's ferroalloy capacity was increased by installation at the Tamos plant in Veracruz State of two new furnaces, each rated at 15 megavolt ampere. These furnaces were built to have the flexibility to produce high-carbon ferromanganese and silicomanganese as well as standard grades of ferrosilicon and silicon metal. In 1981, Autlán produced a total of 163,860 tons of ferroalloys in its Mexican plants, of which almost 110,000 tons was ferromanganese.

As of yearend 1981, Autlán's proven reserves of manganese carbonate ore were sufficient for 25 years at current production rates. In addition, there were probable ore reserves for about 150 years capable of being treated with the current metallurgical plant.

Molybdenum.—Mexico has recovered molybdenum as a byproduct from its mining of porphyry copper deposits. The rise in molybdenum production in 1981 to 451 tons was due to the initial full year of operation of the Cumobabi Mine located in La Verde District, Sonora State, 190 kilometers south of Cananea, and operated by Minera Cumobabi S.A. de C.V. The sharp rise in 1982 output to 5,190 tons reflected startup of the $19 million, 4,500-ton-per-year molybdenum byproduct plant at the La Caridad copper mine.

Silver.—Mexico lost first place to Peru as the world's leading silver producer. Mexico's share of world output fell to 13.3%. Despite the drop in output, silver continued as Mexico's most valuable mineral product, excluding petroleum. In 1980, silver represented 36% of all nonfuel minerals production and 50% of the value of mineral exports, not including oil.

The decline in silver prices in 1981 contin-

ued until June 1982 when the price bottomed at $4.89 per troy ounce. Silver prices averaged $7.95 per ounce in 1982 compared with $10.52 per ounce in 1981 and $20.63 in 1980. Lower prices coupled with reduced export volume produced a drop in export earnings compared with the bonanza year of 1980 when Mexico earned $666 million from silver. The United States remained the leading market for export sales, followed by Japan and the United Kingdom. During 1978-81, Mexico accounted for 24% of U.S. imports.

The major event of 1982 was the inauguration of the Real de Ángeles open pit mine and beneficiation plant, completed at a cost of $170 million in Noria de Ángeles, Zacatecas State.

This largest of all silver mines will be operated by Minera Real de Ángeles S.A. de C.V., founded in 1978 with Mexican (private and Government) and Canadian equity. Full operation at 10,000 tons per day of ore will produce 7 million troy ounces of silver in lead concentrate. Zinc concentrate containing cadmium will also be produced. The lead-silver concentrate was shipped to the PENOLES smelter at Torreón, Coahuila, while the zinc concentrate was sent to the Port of Tampico for export to Yugoslavia and Greece.

Other new mines and expansions in addition to Real de Ángeles were expected to increase Mexico's silver mining capacity to the annual level of 70 to 75 million troy ounces. With full output from Real de Ángeles, Zacatecas State will replace Chihuahua as Mexico's chief producing area.

Lacana Mining Corp. reported production of silver at its 30%-owned Torres mining complex in Guanajuato at 4.5 million ounces. The mill processed more than 648,000 tons of ore averaging 7.8 ounces of silver per ton. The Torres complex is composed of a centrally located 2,200-ton-per-day flotation concentrator fed by ore from four mines, the Torres-Cedros, the Peregrina-Triumvirato, the Cebada, and the Bolanitos. Other partners in the mining operations are Cía. Fresnillo S.A. de C.V. and PENOLES.

Lacana owns 40% of Encantada Mining Group, Coahuila, which operated a 1,300-ton-per-day flotation concentrator fed by three mines, the Encantada, the Los Ángeles, and the Plomo. Silver production totaled 2.1 million ounces from 328,000 tons of ore. Lacana's partner in the Encantada Mining Group is PENOLES.

Silver production by MEDIMSA was reported at 16.2 million ounces, a decrease of nearly 2.7 million ounces from that of 1981. PENOLES' output of refined silver was expected to decline to 29 million ounces in 1982.

In September, PENOLES—Mexico's leading silver producer—opened the Cochico Mine in Cochico, Sonora, and La Minita open pit mine in October at Capela, Michoacán. In addition to silver, Cochico will produce some lead and 16,000 tons per year of zinc, and La Minita will produce some lead and 9,000 tons per year of zinc. In March, IMMSA started up its Rosario silver-lead-zinc underground mine at Rosario, Sinaloa.

NONMETALS

Barite.—Production of barite reached a record high relative to the level of the past decade. Output, however, was below the historic high of 369,000 tons in 1965. Barite demand by PEMEX had been projected to increase to 600,000 tons by 1982, but actual exploration activity required only about 300,000 tons. Mexico appears to have been self-sufficient in 1982 with a small surplus for export. A new mine-mill complex was under construction by Barita de Sonora S.A. de C.V. near Mazatán, 98 kilometers east of Hermosillo in Sonora State. This company is a subsidiary of the Government entity, Fideicomiso Minerales No Metálicos Mexicanos. The complex is on land purchased by the Government for a National Barite Reserve. In the first stage, to begin in June 1983, 150,000 tons per year of direct-shipping-grade ore (92% $BaSO_4$) will be produced.

In operation since 1978, Barita de Santa Rosa S.A., located in Musquiz municipality north of Monterrey, Coahuila State, produced at a rate of 77,000 tons of direct-shipping ore and processed concentrate. Rated capacity was 150,000 tons per year. The company was owned 51% by Hugo Martínez of Monterrey and 49% by IMCO Services Div. of Halliburton Co. Reserves were estimated at 5 million tons, of which less than 1 million tons was proven.

Fluorspar.—The Instituto Mexicana de la Florita reported a sharp drop in total sales of all grades of fluorspar by 51% below 1981 sales to 548,000 tons. Sales of acid-grade fluorspar were down only 36% below 1981 sales to 308,000 tons. This was caused by a loss of sales in the United States, its primary market. Mexico's share of the U.S. market fell to 37% compared with the 66% share in 1980. Mexico suffered from price

competition from the Republic of South Africa and China, a relatively new supplier. In addition, U.S. imports of fluorspar declined 34% from those of 1981.

Mexico retained its position as the world's largest fluorspar producer, but by a much smaller margin. Production of both acid- and metallurgical-grade material was down significantly. Cía. Minera Las Cuevas S.A., operating the world's largest fluorspar mine in the State of San Luis Potosí, produced approximately 272,000 tons of fluorspar compared with nearly 408,000 tons in 1981. Las Cuevas was expanding its mill capacity to 300,000 tons per year of acid-grade fluorspar, with an option to increase to 400,000 tons per year if required. The major producing States were San Luis Potosí (almost 50%), followed by Coahuila, Chihuahua, and Guanajuato.

Graphite (Natural).—Mexico is considered to have the most important deposits of amorphous graphite in the Western Hemisphere. Production of mostly amorphous graphite, which is used as a casting lining, has been in a downtrend since 1973 when over 65,000 tons was produced. The significant decline in output to about 34,000 tons reflected the reduction in U.S. imports caused by the economic recession. Consequently, it appears that Mexico fell to 6th rank as a world producer, but continued as a major factor in the international graphite market. In 1980, Mexico initiated output of crystalline flake graphite in Oaxaca State.

The United States has been an important market for Mexico's amorphous graphite. Except for about 7,000 to 10,000 tons per year used chiefly in Mexico's growing steel industry, the balance has been exported to the United States. In 1981, the United States imported 99% of its amorphous graphite from Mexico valued at $2.6 million. U.S. imports of amorphous and flake graphite from Mexico fell from 39,000 tons in 1981 to 31,000 tons in 1982, accounting for 58% of total U.S. imports.

Most of the significant graphite producers in Mexico were associated or affiliated with U.S. companies. Mexico's largest single graphite producer from the Lourdes and Veta Jecho Mines in Sonora State was Grafitos Mexicanos S.A., owned 51% by private Mexican interests and 49% by Cummings Moore Graphite Co., a subsidiary of Asbury Graphite Mills Inc. of New Jersey. Grafitos Mexicanos opened two medium-sized mines 25 kilometers east of Tonichi near Onavas and a small mine near Ciudad Obregón also in Sonora. In 1982, 1,850 tons of crystalline flake graphite was produced by Grafito de México S.A. de C.V., a subsidiary of State-run Fideicomiso Minerales, at an open pit mine at Telixtlahuaca, 30 kilometers north of Oaxaca, Oaxaca State. Reserves of 4.4 million tons contained 4% graphite. Most of the beneficiated product with 95% carbon content was exported to the United States.

Phosphate Rock.—Since production of phosphate rock first began in 1967 at the annual level of 50,000 tons, output has expanded tenfold to a historic high in 1982 of more than 512,000 tons. In 1981, Mexico had to import 1.2 million tons of phosphate rock, of which 72% came from Morocco and 28% from the United States. On the basis of new mining projects underway, Mexico was expected to become self-sufficient in 1985 with a surplus for exports. Domestic demand in that year is projected at 2 million tons.

Mexico's recession in 1982 was not reflected in the fertilizer industry, which grew by almost 24% in 1981 and by 27% in 1982. The recent considerable jump in output is attributed to the second full year of operations of State-owned Roca Fosfórica Mexicana S.A. de C.V. of the San Juan de la Costa Mine in Baja California Sur. Output from this new mine was 295,000 tons of concentrate grading 31% P_2O_5 from its rated annual capacity of 720,000 tons. The output of San Juan was originally to be shipped wet to the new $450 million fertilizer complex at Lázaro Cárdenas under construction by Fertilizantes Mexicanas S.A. and was scheduled for completion in mid-1984. Delayed startup of the complex has meant that drying plants will have to be installed.

Salt.—Exportadora del Sal S.A. (ESSA) prepared a 6-year expansion plan to increase its solar salt capacity from 6 to 8 million tons annually at its evaporative facilities at Guerrero Negro on the west coast of Baja California. ESSA was by far Mexico's largest producer and exporter of salt and the world's largest single salt-producing company. Government policy excluded ESSA from the domestic market because its production costs are far lower than those of the more than 100 small producers that traditionally have supplied the local market. While salt is sold in Mexico for about $50 per ton, ESSA's export price is as low as $12 per ton. ESSA could easily supply Mexico's annual consumption

of 850,000 tons, representing only 15% of its peak production of 5.7 million tons.

Since nationalization of the original Daniel K. Ludwig saltworks in 1976, annual production at Guerrero Negro has increased from 3.7 to 5.7 million tons. Mitsubishi Corp. of Japan has a 49% ownership. ESSA's biggest sales year was in 1980 when it exported 5.7 million tons of salt, mostly to Japan and the United States. ESSA supplied 50% of Japan's needs. The purity of ESSA's salt has been increased through brine control from 99.66% sodium chloride in 1970 to 99.72% in 1980, a high world standard.

Mexico achieved a historic high in its salt output of 8 million tons. While it ranked 6th as a world producer, it was the world's major salt exporter—primarily from ESSA's deepwater port complex on Cedros Island. In 1982, the United States imported 1.2 million tons valued at $16.5 million from Mexico or about 25% of U.S. salt imports.

Sulfur.—As Latin America's largest sulfur producer, Mexico's export sales suffered from reduced demand by the United States and Western Europe. Total sulfur exports fell 20% below those of 1981 to 953,000 tons, of which 690,000 tons valued at $87 million went to the U.S. market. The United States has traditionally been Mexico's most important export market, taking about 80% of Mexico's exports. On the other hand, Mexico is the second most important source after Canada for U.S. imports. During 1978-81, Mexico was the source of 42% of U.S. imports. Sulfur was Mexico's most important nonmetallic mineral, accounting for about 6% of the value of total mineral production and 8% of mineral trade, not including oil. Domestic consumption of sulfur has increased from 655,000 tons in 1979 to 950,000 tons in 1982. Of this amount, 75% was for fertilizer production and 25% was for industrial consumption.

Mexico's largest sulfur producer using the Frasch hot-water process, Azufrera Panamericana S.A. (APSA), had its first full year of operations at its new Coachapa Mine, which is a field of 20 producing wells located near APSA's Jaltipán operation south of Coatzacoalcos Port. Output of the field was estimated at 150,000 tons out of the rated capacity of 600,000 tons per year. The Coachapa Mine is estimated to have 7.3 million tons of sulfur reserves out of the 80 million tons estimated for the whole country. Mexico exported its sulfur from the Gulf Port of Coatzacoalcos. To improve its marketing, APSA operated a terminal in Tampa, Fla., through its subsidiary, Pasco Terminals Ltd.

MINERAL FUELS

At yearend, the new administration was preparing a revised national energy development plan to take into account the less favorable trends in the international and domestic economies. The plan, to be readied by mid-1983, will outline strategy for development of hydrocarbon resources and electrical energy facilities up to the year 2000 rather than the 10-year program covered in the 1980 document. The most critical item to be covered will be the Government's policy regarding the level of oil production and exports.

At yearend 1981, the electrical power system operated by the CFE had an installed capacity of 17,000 megawatts. In 1981, CFE's system was 38% hydroelectric, 59% fuel oil and gas-fired thermal, 2% coal-fired thermal, and 1% geothermal.

The entering administration was expected to scale down the previous Government's ambitious nuclear energy development program, which involved installation of 20,000 megawatts of nuclear generating capacity by the end of the century. The nuclear alternative would be substituted in part by accelerated development of hydroelectric and coal-fired thermal electric plants, and geothermal power programs.

A subministry of energy was created for the first time within the new Secretariat of Energy, Mines, and Parastate Industries to deal exclusively with energy matters. The head of this new subdivision is to be a member of the Board of Directors of PEMEX, CFE, the Nuclear Safety Commission, and several energy-related Government research institutes.

Coal.—The amount of coal produced was about 6% lower than the 1981 peak output of 8 million tons because of reduced demand by the steel industry. About 90% of coal mined in Mexico was metallurgical grade for the production of coke. For this purpose, Mexico was nearly self-sufficient. A small but growing amount of steam coal was mined for coal-fired electrical generating plants. The Government appears committed to diversifying its sources of electric power as a means of conserving oil for export. The resurgence of steam coal extraction has given new impetus to an industry dormant since Mexico switched from coal to oil-burning rail locomotives.

The major steam coal producer was Minera Carbonífera Río Escondido S.A.

(MICARE), set up with Government equity in 1977 to supply steam coal for Mexico's first coal-fired powerplant. MICARE operated both open pit and underground mines for steam coal from deposits in Coahuila State, the country's chief coal-producing area. Mexico's output of steam coal has expanded from 167,000 tons in 1971 to 1.2 million tons in 1981 to supply the Río Escondido electric generating complex at Piedras Negras, Coahuila. In 1982, the first 300-megawatt unit at Río Escondido used about 750,000 tons of steam coal. The second 350-megawatt unit at this site, originally scheduled for completion in 1982, was delayed for budgetary reasons. MICARE brought onstream a large new coal mine to build stockpiles for the complex.

Upon request from the State of Texas, Mexico was studying the possibility of exporting surplus electricity from the Río Escondido complex located on the U.S.-Mexican border to the city of Eagle Pass, Tex.

Natural Gas.—Output of natural gas has doubled since 1977, reaching a level of 4 billion cubic feet per day. The major part of Mexico's output of natural gas was associated with crude oil production. Earlier, a considerable amount had been flared. However, Mexico now has the pipeline network and domestic demand to utilize practically all of its output with a limited amount for export. Gas exports accounted for about 3% of PEMEX's foreign exchange earnings.

There were some indications that Mexico's natural gas reserves, which comprised about 20% of the country's hydrocarbon reserves, were smaller than formerly estimated.

Mexico initiated exports of natural gas to the United States in January 1980 at the delivery rate of 288 million cubic feet per day and at a cost of $3.36 per thousand cubic feet. At yearend 1982, the cost of importing Mexican gas was on the changed basis of $4.94 per million british thermal unit. Natural gas imports from Mexico represented about 12% of all foreign gas entering the United States. As a result, of weak U.S. demand, imports probably would be reduced to the minimum contract level of 180 million cubic feet per day. Mexico's gas income was therefore expected to drop from about $540 million per year to $355 million in 1983. In 1977, it had been projected that exports to the United States would expand to 2 billion cubic feet per day by 1982, earning $1.6 billion per year.

Petroleum.—For the first time since the nationalization of the oil industry in 1938, Mexico's annual output of crude oil surpassed 1 billion barrels. Oil output continued the impressive rate of growth of the last 5 years by increasing 19% over that of 1981, giving an average annual growth of 23% per year since 1977. The average output of 2.75 million barrels per day of crude in 1982 compares dramatically with the daily average of 106,000 barrels in 1938. Peak output occurred in December when 3,023 million barrels per day was produced. Total output includes about 160,000 barrels per day produced from secondary recovery techniques using water-injection schemes primarily at Poza Rica in the Central Zone.

The Gulf of Campeche offshore area continued as the main oil-producing field, having first replaced the Comalcalco area as the main producer in 1981. The Gulf of Campeche development includes 12 large offshore oilfields headed by the Cantarell complex.

PEMEX achieved a record high in exports of crude oil in 1982. Crude oil exports increased from 1,090,000 barrels per day in 1981 to 1,492,000 barrels per day in 1982. Mexico's oil exports have assumed a growing relative importance since 1976. Increasing amounts of oil have become available for export as production exceeded domestic demand. Exports to the United States in 1982 were at the rate of about 700,000 barrels per day. Trade statistics imply a growing dependency of the United States on Mexico as a source of crude oil imports. In 1982, Mexico surpassed Saudi Arabia and Nigeria as the leading U.S. crude oil supplier.

Between 1977 and 1982, PEMEX completed the most intensive oil exploration program in the country's history in the Campeche area. As a result, probable reserves increased from 80 billion to 90 billion barrels. Proved reserves remained the same at 72 billion barrels, and potential reserves, including proved and probable reserves, remained at 250 billion barrels.

Table 5.—Mexico: Salient crude oil statistics[1]

	1978	1979	1980	1981	1982
Production ____ thousand 42-gallon barrels	441,348	533,329	708,454	843,933	1,002,430
Exports:					
Quantity ____ do	133,247	194,488	302,129	400,778	544,617
Value ____ millions	$1,774	$3,811	$9,449	$13,305	$15,623
Share of total Mexican exports ____ percent	29	43	62	69	74
To the United States:[2]					
Total ____ thousand 42-gallon barrels	112,072	162,740	194,172	177,510	264,988
Share of total U.S. imports ____ percent	5	7	10	10	19

[1]Based on annual reports of PEMEX (Memoria de Labores).
[2]Based on U.S. Department of Commerce import data.

Uranium and Nuclear Energy.—At year-end, construction of Mexico's first nuclear powerplant, begun in 1973, Laguna Verde I in Veracruz State, was 70% complete. Laguna Verde II, about 25% complete, was placed in suspended status. The General Electric Co. is supplying the light-water technology. Total cost will be over $2 billion.

Uranio Mexicano S.A. (URAMEX) was completing a $35 million mine project at Peña Blanca, Chihuahua, a uranium deposit discovered in 1960. The Peña Blanca project comprises three mines, which are expected to yield 1,350 tons per year of yellow cake with a mine life of 7 years at full production levels. URAMEX was also constructing a beneficiation plant at Peña Blanca with milling capacity of 650 tons of ore per day scheduled for completion in August.

[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Mexican pesos (Mex$) to U.S. dollars at the average rate for 1982 of Mex$57.18=US$1.00. The free market rate at yearend was Mex$149=US$1.00.
[3]Nacional Financiera La Demanda de Bienes de Capital Para la Mineria en México. Mexico City, 1982.
[4]Banco de México. Informe Anual, 1982. P. 83.
[5]Consejo de Recursos Minerales. Anuario de la Minería Mexicana—1980. Mexico, D.F., 1981, p. 17.
[6]Cámara Minera de México. Minería Camimex, v. 4, No. 16, July-August 1983, p. 7.

The Mineral Industry of Morocco

By George A. Morgan[1]

The decline in demand of phosphate rock caused strain on the Moroccan economy. The export value of phosphate rock and phosphate fertilizer derivatives was $916 million, about 6% of a gross domestic product of $15,151 million.[2] The denomination of fertilizer sales in U.S. currency resulted in further weakness in the economy owing to the strength of the dollar. Although production and sales of crude phosphate rock were in decline, the processed fertilizers were up in terms of total export value as new facilities came onstream.

Despite the loss in terms of quantity and value of the mining sector's principal commodity, other mineral products performed well. The Bureau de Recherches et de Participations Minières (BRPM) continued to maintain its position as a catalyst in augmenting output of both metallic and nonmetallic minerals. Several projects advanced by BRPM came into fruition in 1982.

The Government made attempts to correct imbalances in trade as well as to minimize the ill effects of a severe drought. A number of loan agreements were signed involving Saudi Arabia, the World Bank, France, the United States, and Japan. In addition, the investment code was modified to favor foreign investment in Morocco, particularly enterprises that drew employment away from major population centers into rural areas. Although a new mining code has been drafted, it has not been forwarded to parliament; consequently, the 1973 mining investment code remains in effect.

PRODUCTION AND TRADE

Lack of demand led to a substantial reduction in output of crude phosphate rock, which in recent years has exceeded $1 billion in export revenues. However, recent developments and expansions for a number of metallic and nonmetallic minerals led to substantial production increases. The commodities most affected were copper, iron ore, antimony, refined lead, zinc, silver, and barite.

Materials of importance to the Moroccan economy that experienced reduction in output were sulfur, fluorspar, and mine lead. While fluorspar and lead have a limited local market and for the most part were exported, sulfur was of great importance to the phosphate industry. Output ceased at the Kettara Mine, where pyrrhotite was the main product. Imports of sulfur had been increasing rapidly for the production of sulfuric acid for use in the processed fertilizer sector. Imports of crude sulfur were in excess of 800,000 tons at a cost of about $100 million in 1981. Although byproduct sulfur may become available from iron ore mining, further increases in imports were expected upon completion of a 138,000-ton-per-year sulfuric acid plant at Jorf Lasfar.

Table 1.—Morocco: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Antimony concentrate:					
Gross weight	5,265	4,384	1,278	1,120	2,011
Metal content	2,211	1,973	550	504	905
Cobalt concentrate:					
Gross weight	8,719	8,008	6,704	6,265	6,338
Metal content	1,134	961	838	789	792
Copper concentrate:					
Gross weight	12,217	23,500	24,067	23,304	63,350
Metal content	4,657	7,050	7,220	6,710	20,905
Iron and steel:					
Iron ore, direct-shipping:					
Gross weight	58,938	61,700	78,020	49,854	223,820
Iron content	37,720	39,488	49,933	30,909	138,768
Metal:					
Pig iron[e]	12,000	12,000	12,000	12,000	12,000
Steel, crude[e]	6,000	6,000	6,000	6,000	6,000
Lead:					
Concentrate:					
Gross weight	167,054	165,300	172,320	168,406	148,515
Metal content	100,230	115,710	115,454	116,200	103,960
Metal:					
Smelter, primary only[e]	28,600	35,300	40,300	[r]50,200	57,000
Refined:					
Primary	28,518	35,275	40,261	50,149	56,533
Secondary[e]	1,500	1,500	2,100	2,100	2,100
Total	30,018	36,775	42,361	52,249	58,633
Manganese ore, largely chemical-grade	126,200	135,700	131,315	109,647	94,120
Nickel, Ni content of cobalt ore[e]	174	160	134	130	127
Silver, mine output, metal content thousand troy ounces	3,131	3,283	3,154	2,119	2,602
Tungsten, mine output, metal content kilograms	--	1,134	3,165	[3]	--
Zinc concentrate:					
Gross weight	12,217	12,900	13,798	15,775	22,422
Metal content	4,276	4,515	6,071	7,888	11,211
NONMETALS					
Barite	176,813	286,467	320,585	463,869	537,995
Cement, hydraulic thousand tons	2,819	3,276	3,552	3,606	3,717
Clays, crude:					
Bentonite	4,800	1,015	3,284	2,906	4,457
Fuller's earth (smectite)	8,000	13,586	17,430	19,750	24,604
Montmorillonite (ghassoul)	2,065	5,518	4,271	8,670	4,271
Feldspar	--	--	1,594	2,156	1,025
Fluorspar, acid-grade	54,200	63,200	64,400	66,700	50,200
Mica	--	363	331	1,805	512
Mineral water cubic meters	20,400	46,007	69,124	70,240	34,375
Phosphate rock (includes Western Sahara) thousand tons	19,713	20,000	18,824	18,562	17,095
Pigments, mineral: Natural iron oxide (goethite)	[e]20	25	121	[3]	--
Pyrites and pyrrhotite, gross weight	190,400	197,115	124,576	76,225	--
Salt, all types	34,813	102,000	67,477	47,219	63,592
Sulfur, S content of pyrites	60,924	63,077	36,052	22,105	--
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite thousand tons	720	710	680	703	735
Fuel briquets do	[e]7,000	NA	NA	[3]	--
Gas, natural:					
Gross million cubic feet	2,898	2,666	[e]3,000	[e]3,000	NA
Marketed do	2,800	2,600	[e]2,900	[e]2,400	NA
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	187	140	[e]365	[e]300	NA
Refinery products:					
Gasoline do	2,017	3,810	2,980	[e]3,000	NA
Jet fuel do	1,196	2,028	NA	[e]2,100	NA
Kerosine do	550	506	NA	[e]500	NA
Distillate fuel oil do	5,081	8,838	8,840	[e]10,200	NA
Residual fuel oil do	9,412	12,399	12,100	[e]12,400	NA
Other do	833	1,783	1,800	[e]2,000	NA
Refinery fuel and losses do	1,126	[e]1,650	NA	[e]1,800	NA
Total do	20,215	31,014	NA	[e]32,000	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through June 27, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials is produced, but available information is inadequate to make reliable estimates of output levels.

[3]Revised to zero.

Table 2.—Morocco: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	650	1,129	--	United Kingdom 479; France 452.
Unwrought	--	1,564	--	All to Italy.
Semimanufactures	15	(1)	--	All to Switzerland.
Antimony: Ore and concentrate	1,159	1,260	--	Yugoslavia 861; France 334; Spain 65.
Cobalt: Ore and concentrate	7,489	6,333	--	Mainly to France.
Copper:				
Ore and concentrate	22,274	22,207	--	Spain 6,867; Finland 6,000; West Germany 5,797.
Matte and speiss including cement copper	1,743	2,215	--	Belgium-Luxembourg 1,463; West Germany 752.
Oxides and hydroxides kilograms	250	--		
Metal including alloys:				
Scrap	r1,591	1,860	--	United Kingdom 728; Belgium-Luxembourg 491; Spain 249.
Unwrought kilograms	12	--		
Semimanufactures do.	20,832	443	10	France 215; Netherlands 160; Saudi Arabia 50.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	--	5,360	--	All to West Germany.
Pyrite, roasted	143,502	64,382	--	Albania 30,758; West Germany 26,034; Spain 6,090.
Metal:				
Scrap	34,667	50,945	--	Spain 22,918; Italy 15,410; Yugoslavia 5,226.
Pig iron, cast iron, related materials	(1)	16	(1)	Mainly to France.
Steel, primary forms	750	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections	126	--		
Universals, plates, sheets	151	--		
Tubes, pipes, fittings	3	--		
Lead:				
Ore and concentrate	111,637	89,735	--	France 21,279; Tunisia 17,469; West Germany 11,279.
Metal including alloys, unwrought	32,806	42,488	--	Italy 32,344; Romania 5,004; Netherlands 2,139.
Manganese: Ore and concentrate	112,317	99,668	24,018	France 26,468; West Germany 12,216; Spain 12,126.
Silver:				
Waste and sweepings[2] value, thousands	--	$69	--	All to France.
Metal including alloys, unwrought and partly wrought troy ounces	777	1,008	--	United Kingdom 505; France 260; Switzerland 193.
Zinc:				
Ore and concentrate	12,948	16,476	--	France 9,236; West Germany 5,742; United Kingdom 1,498.
Blue powder	--	59	--	All to France.
Matte	166	310	--	France 143; Spain 132; India 35.
Ash and residue containing zinc	157	245	--	France 160; Spain 85.
Metal including alloys:				
Scrap	257	514	--	United Kingdom 215; France 180; Spain 119.
Unwrought	--	43	--	All to United Kingdom.
Other:				
Ores and concentrates	1,580	--		
Oxides and hydroxides	2	2	--	All to France.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc kilograms	--	10	--	Do.
Grinding and polishing wheels and stones	8	--		
Barite and witherite	333,820	452,977	226,664	Norway 60,234; United Kingdom 39,426; Mexico 26,400.
Cement	1,241	3,901	NA	Spain 3,676.

See footnotes at end of table.

Table 2.—Morocco: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Chalk	12	--		
Clays and clay products:				
Crude: Unspecified	25,963	25,353	(1)	Spain 12,924; Tunisia 2,244.
Products:				
Nonrefractory	32	1,472	NA	NA.
Refractory including nonclay brick	r3,228	5,866	--	Iraq 1,857; Libya 1,810; Syria 768.
Feldspar, fluorspar, related materials:				
Fluorspar	r64,070	54,180	9,540	Canada 36,450; Norway 8,190.
Unspecified kilograms	--	174	--	All to France.
Fertilizer materials: Manufactured:				
Phosphatic	161,792	247,254	--	Burma 55,061; Indonesia 45,500; Bulgaria 35,870.
Unspecified and mixed	6,064	22,702	--	Spain 17,684; Italy 3,018; India 2,000.
Gypsum and plaster	206,022	221,598	--	Nigeria 93,550; Ivory Coast 22,700; Senegal 18,345.
Lime	88	207	NA	NA.
Mica: Crude including splittings and waste	485	1,353	--	France 1,315; United Kingdom 38.
Phosphates, crude thousand tons	16,527	15,635	--	Spain 2,348; Poland 1,280; United Kingdom 989.
Pigments, mineral: Iron oxides and hydroxides, processed	1	1	--	All to France.
Precious and semiprecious stones other than diamond kilograms	3	--		
Salt and brine	3,001	74	--	Italy 50; Ivory Coast 20; Zaire 4.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,668	2,580	NA	Italy 1,824; West Germany 215.
Worked	2	4	--	Mainly to France.
Gravel and crushed rock	42,944	68,268	NA	NA.
Sand other than metal-bearing	7,363	24,233	NA	NA.
Talc, steatite, soapstone, pyrophyllite	1	--		
Other:				
Crude kilograms	450	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	6,506	6,665	--	Tunisia 3,915; Nigeria 1,533; Liberia 1,039.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	180	--		
Coal:				
Anthracite	81,012	62,935	--	United Kingdom 25,560; France 18,525; Tunisia 9,450.
Bituminous	3,150	--		
Gas, natural kilograms	--	101	--	All to France.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	194,242	82,743	--	Italy 42,920; Portugal 28,223; France 11,600.
Gasoline:				
Aviation do	11,884	7,795	--	All to bunkers.
Motor thousand 42-gallon barrels	1,687	1,719	--	Netherlands 1,707; Italy 12.
Kerosine and jet fuel 42-gallon barrels	528,720	498,844	--	All to bunkers.
Distillate fuel oil do	r102,105	56,532	--	Do.
Lubricants do	1,967	2,366	--	Do.
Residual fuel oil do	570,982	62,344	--	Do.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include platinum-group metals.

Table 3.—Morocco: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Cesium and rubidium	2	4	4	
Lithium:				
Oxides and hydroxides	12	21	10	France 6; West Germany 5.
Metal including alloys, all forms kilograms	--	1	--	All from West Germany.
Alkaline-earth metals do	2	--		
Rare-earth metals do	--	7	--	United Kingdom 5; West Germany 2.
Aluminum:				
Ore and concentrate	519	6,931	--	Guyana 5,000; Denmark 970; Italy 940.
Oxides and hydroxides	2,399	2,044	10	France 1,938; Hungary 80.
Metal including alloys:				
Scrap kilograms	1	--		
Unwrought	1,060	1,083	--	France 911; Spain 137.
Semimanufactures	4,466	4,463	(1)	France 2,338; Spain 671; Belgium-Luxembourg 433.
Antimony: Metal including alloys, all forms	30	--		
Beryllium: Metal including alloys, all forms kilograms	--	2	(1)	Mainly from France.
Bismuth: Metal including alloys, all forms value	$283	--		
Cadmium: Metal including alloys, all forms kilograms	864	--		
Chromium:				
Ore and concentrate	40	20	--	All from Belgium-Luxembourg.
Oxides and hydroxides	11	14	--	West Germany 8; Belgium-Luxembourg 2; France 2.
Metal including alloys, all forms value	$210	--		
Cobalt:				
Oxides and hydroxides kilograms	2,966	252	22	West Germany 220; Netherlands 10.
Metal including alloys, all forms do	10	--		
Columbium and tantalum: Metals including alloys, all forms, tantalum do	5	2	--	All from France.
Copper:				
Oxides and hydroxides	12	11	--	Norway 7; France 2; West Germany 2.
Metal including alloys:				
Scrap	(1)	1	--	All from France.
Unwrought	303	565	--	France 365; West Germany 126; Italy 72.
Semimanufactures	8,293	7,545	2	Spain 3,368; France 2,195; Italy 836.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	1,157	--		
Iron and steel: Metal:				
Scrap	174	1,703	--	United Kingdom 1,675; Spain 28.
Pig iron, cast iron, related materials	1,536	1,380	--	France 586; Spain 506; Belgium-Luxembourg 248.
Ferroalloys, unspecified	391	392	--	Belgium-Luxembourg 134; West Germany 92; France 62.
Steel, primary forms	22,336	17,961	--	West Germany 6,469; France 4,493; Spain 3,999.
Semimanufactures:				
Bars, rods, angles, shapes, sections	318,163	341,104	--	Spain 266,299; France 37,614; Italy 13,262.
Universals, plates, sheets	125,584	132,815	528	France 67,153; West Germany 28,071; Spain 11,239.
Hoop and strip	17,008	9,271	34	France 6,679; Belgium-Luxembourg 1,142; Italy 803.
Rails and accessories	1,704	5,444	--	France 5,251; Belgium-Luxembourg 67.
Wire	11,173	5,795	(1)	France 3,011; Belgium-Luxembourg 2,421.
Tubes, pipes, fittings	16,028	22,488	31	France 8,313; Japan 5,578; West Germany 3,227.
Castings and forgings, rough	154	92	(1)	France 41; West Germany 38; Spain 7.

See footnotes at end of table.

Table 3.—Morocco: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides	267	2,225	--	France 848; Spain 604; Italy 341.
Metal including alloys:				
Scrap kilograms	15	--		
Unwrought	34	58	--	Netherlands 56; France 2.
Semimanufactures	66	26	--	Netherlands 13; France 12.
Magnesium: Metal including alloys, all forms kilograms	70	1,423	--	Italy 1,030; Belgium-Luxembourg 371.
Manganese:				
Ore and concentrate	900	336	--	Belgium-Luxembourg 300; United Kingdom 36.
Oxides	579	520	--	Belgium-Luxembourg 460; Ireland 60.
Mercury 76-pound flasks	r287	252	--	China 145; Spain 100.
Metalloids:				
Arsenic, oxides and acids kilograms	11,426	8	--	France 6; West Germany 2.
Phosphorus do	8	481	--	West Germany 451; Hungary 30.
Selenium do	2,477	552	--	Belgium-Luxembourg 500; West Germany 52.
Silicon	36	13	--	France 9; Spain 4.
Unspecified	2	1	--	All from Netherlands.
Molybdenum:				
Oxides and hydroxides kilograms	12	22	--	West Germany 16; France 6.
Metal including alloys, all forms do	483	81	--	Hungary 25; Poland 23; United Kingdom 14.
Nickel:				
Matte and speiss	6	12	--	United Kingdom 10; France 2.
Oxides and hydroxides kilograms	1	101	--	France 51; Netherlands 50.
Metal including alloys:				
Unwrought	8	14	--	France 10; United Kingdom 3; Belgium-Luxembourg 1.
Semimanufactures	1,257	613	(1)	West Germany 353; France 120; Italy 111.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	5	2	--	All from West Germany.
Silver: Metal including alloys, unwrought and partly wrought do	7,973	177,986	--	France 165,833; West Germany 10,031; United Kingdom 2,122.
Tin:				
Oxides kilograms	10	--		
Metal including alloys:				
Unwrought	185	190	--	Thailand 90; Malaysia 83; Italy 10.
Semimanufactures	15	11	--	France 4; Netherlands 4; Japan 1.
Titanium:				
Oxides	1,737	--		
Metal including alloys, all forms kilograms	70	--		
Tungsten:				
Oxides and hydroxides do	1	--		
Metal including alloys, all forms do	404	608	--	Poland 303; France 276.
Uranium and/or thorium: Metal including alloys, all forms, thorium do	3	--		
Vanadium: Oxides and hydroxides do	14	2	--	All from West Germany.
Zinc:				
Oxides	543	487	--	France 377; Netherlands 74; West Germany 23.
Metal including alloys:				
Scrap kilograms	1	50	--	All from West Germany.
Unwrought	3,298	2,568	--	France 1,125; Belgium-Luxembourg 809; Netherlands 475.
Semimanufactures	239	217	--	France 155; West Germany 34; Belgium-Luxembourg 15.
Other:				
Ores and concentrates	--	142	--	Australia 124; France 18.
Oxides and hydroxides kilograms	245	319	--	France 278; West Germany 38.
Pyrophoric alloys do	150	4	--	All from Spain.
Base metals including alloys, all forms	6	22	(1)	Spain 17; Bolivia 5.

See footnotes at end of table.

Table 3.—Morocco: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	52	82	--	Italy 35; France 27; Greece 16.
Artificial: Corundum	80	59	--	All from France.
Dust and powder of precious and semiprecious stones, diamond carats	--	150	--	Do.
Grinding and polishing wheels and stones	339	445	(1)	Italy 229; France 116.
Asbestos, crude	6,770	6,630	--	West Germany 2,403; Botswana 2,230; Republic of South Africa 1,060.
Barite and witherite kilograms	3	--		
Boron materials:				
Crude natural borates	650	(1)	--	All from France.
Oxides and acids	10	20	--	France 8; Belgium-Luxembourg 7; Turkey 4.
Cement	39,122	33,016	--	Spain 28,112; France 4,703.
Chalk	7,008	8,594	--	France 7,748; Spain 676; Belgium-Luxembourg 130.
Clays and clay products:				
Crude, unspecified	19,050	14,222	247	France 9,531; United Kingdom 3,954.
Products:				
Nonrefractory	6,048	2,501	--	Spain 1,240; Italy 745; France 356.
Refractory including nonclay brick	r4,816	2,661	63	France 1,615; West Germany 930.
Diamond: Industrial carats	5,650	--		
Diatomite and other infusorial earth	255	331	--	Belgium-Luxembourg 200; Spain 98; France 28.
Feldspar, fluorspar, related materials	444	690	--	France 530; Sweden 150; West Germany 10.
Fertilizer materials:				
Crude, n.e.s	--	5	--	All from France.
Manufactured:				
Ammonia	42,087	54,147	--	U.S.S.R. 46,870; Portugal 4,359; Netherlands 2,815.
Nitrogenous	258,056	191,158	--	West Germany 82,208; Romania 45,444; France 25,237.
Potassic	78,394	74,362	--	East Germany 27,565; Spain 25,880; U.S.S.R. 15,659.
Unspecified and mixed	r507	621	6	Belgium-Luxembourg 405; West Germany 100; Netherlands 100.
Graphite, natural	23	26	--	France 17; Spain 5; United Kingdom 3.
Gypsum and plaster	104	153	--	France 112; Spain 40.
Halogens:				
Bromine kilograms	57	93	--	West Germany 63; Switzerland 30.
Chlorine	1	1	--	All from West Germany.
Iodine kilograms	419	444	--	France 313; West Germany 128.
Lime	600	1,240	--	All from France.
Magnesium compounds: Magnesite	140	115	(1)	Spain 74; Austria 38.
Mica:				
Crude including splittings and waste	9	20	10	France 5; Norway 4.
Worked including agglomerated splittings	1	--		
Pigments, mineral: Iron oxides and hydroxides, processed	972	859	--	West Germany 461; United Kingdom 233; France 59.
Salt and brine	5	10,258	--	Tunisia 10,250; United Kingdom 4.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	250	217	--	France 105; Belgium-Luxembourg 36; Italy 34.
Sodium carbonate, natural and manufactured	14,156	12,210	--	France 11,288; Bulgaria 550; Romania 300.
Sodium hydroxide	8,857	7,538	--	France 6,489; West Germany 1,005.
Sodium sulfate, natural and manufactured	3,313	2,632	--	Romania 1,050; West Germany 640; Belgium-Luxembourg 356.

See footnotes at end of table.

Table 3.—Morocco: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	71	--		
Worked	323	76	--	Italy 30; France 24; Portugal 21.
Dolomite, chiefly refractory-grade	90	186	--	France 163; Spain 23.
Gravel and crushed rock	11	1	--	All from France.
Quartz and quartzite	23	471	--	Belgium-Luxembourg 450; France 12; West Germany 9.
Sand other than metal-bearing	31,108	31,899	--	Belgium-Luxembourg 30,738; Italy 1,065; France 96.
Sulfur:				
Elemental:				
Crude including native and by-product	702,386	810,436	6	Canada 507,650; Poland 270,995; France 31,612.
Colloidal, precipitated, sublimed kilograms	3,195	29	--	West Germany 15; France 13.
Sulfuric acid	15	17	--	West Germany 9; France 4; Belgium-Luxembourg 2.
Talc, steatite, soapstone, pyrophyllite	917	822	--	France 744; Spain 36; China 20.
Vermiculite	10	10	--	France 5; Spain 5.
Other:				
Crude	620	400	--	France 151; Canada 144; Spain 100.
Oxides and hydroxides of barium, magnesium, strontium	21	42	4	France 17; Netherlands 13; West Germany 5.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1	4	(1)	France 3.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3	11	10	France 1.
Carbon: Carbon black	5,092	4,170	4	Spain 1,952; France 1,009; Italy 487.
Coal:				
Anthracite and bituminous	9,949	10,068	(1)	France 7,068; West Germany 3,000.
Briquets of anthracite and bituminous coal	2	3	--	All from Spain.
Lignite including briquets	5	--		
Coke and semicoke	18,619	32,559	--	West Germany 15,315; Italy 15,166; Belgium-Luxembourg 2,078.
Hydrogen, helium, rare gases	r55	106	(1)	France 83; Spain 13; Italy 10.
Peat including briquets and litter	3,180	2,810	--	West Germany 1,574; Netherlands 1,236.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	29,621	32,918	--	Saudi Arabia 20,078; U.S.S.R 4,001; Kuwait 3,768.
Refinery products:				
Liquefied petroleum gas do	986	1,510	(1)	France 661; Spain 195; United Kingdom 149.
Gasoline 42-gallon barrels	65,756	66,695	--	Netherlands 55,310; Belgium-Luxembourg 11,378.
Mineral jelly and wax do	187,731	101,445	86	Greece 30,993; Venezuela 28,210; Spain 16,324.
Kerosine and jet fuel do	16	(1)	--	All from France.
Distillate fuel oil do	285,725	--		
Lubricants do	350,854	359,474	1,624	France 301,412; Netherlands 33,622.
Residual fuel oil do	--	80	--	All from France.
Pitch and pitch coke do	733	1,176	--	France 1,048; Italy 121.
Bitumen and other residues do	97,439	15,425	--	Spain 14,780; West Germany 273.
Bituminous mixtures do	2,679	209	--	France 130; West Germany 79.
Tars and other crude chemicals derived from coal, gas, and petroleum	r757	992	--	Netherlands 375; Spain 302; France 130.

rRevised.
1Less than 1/2 unit.

COMMODITY REVIEW

METALS

Cobalt.—Production by Compagnie de Tifnout Tiranimine (CTT) at the Bou Azzer mining district ceased at yearend owing to depletion of economic reserves. CTT was 40% owned by BRPM and 60% by Omnium Nord Africain. Cobalt has been mined from the region since 1930, with intermittent stoppages owing to slack demand. All output has been exported as a complex arsenic sulfide concentrate, with cobalt content not exceeding 2,000 tons per year. About 600 people were employed at the mines and mill.

Ore at Bou Azzer grades 1.2% to 1.4% cobalt. Cobalt minerals, mainly skutterudite in massive, crystalline, and nodular forms, were found in a quartz carbonate matrix near a serpentinite contact. About 60,000 tons per year of ore was processed to obtain a concentrate grading 10% to 12% cobalt. The cobalt content of about 6 million tons of tailings at the main tailings pond was reported at 0.4%.

Copper.—Commercial production of copper concentrates commenced at the Bleida Mine in March. At yearend, full planned capacity of 50,000 tons per year of copper concentrate grading 32% to 34% copper was reached. A further increase in capacity to 100,000 tons per year of concentrate was planned. The concentrate was shipped by truck to Agadir, about 330 kilometers distant. Mine reserves were reported at 1.4 million tons grading 8% copper and 1.2 million tons grading 7% copper. Cutoff grade for minable ore was 3% copper.

The entire mine was accessed by a decline. Both ore and waste rock were moved via two parallel 4.5-kilometer-long, 40-inch wide conveyor belts. Transport to ore chutes was via load-haul-dump vehicles. The mill was fully automated, and all transport was by conveyor or pipeline slurry. Copper recovery was above 92%. Oxide ores, particularly malachite and azurite, were being stockpiled for possible future treatment.

Iron Ore.—Difficulties encountered in the exploitation and preparation of iron ore in the Province of Nador by Mines de Rif continued to be overcome. Output has increased over fourfold from that of 1981. Production had been as high as 820,000 tons in 1970, but declined to 441,000 tons in 1977 as direct shipping grade hematite ore was exhausted. Throughput capacity of a plant to treat magnetite, commissioned in 1972, was 4,000 tons per day of ore grading about 50% iron, 5% sulfur, and 12% SiO_2. Iron oxide pellet capacity was 2,600 tons per day with a pellet grade of 66% iron, 0.5% sulfur, and 2% SiO_2. Output of pyrite as a byproduct was planned at 240 tons per day. Minable reserves were reported at 33 million tons grading 49.6% iron with high pyrite content. Fine grinding of the magnetite concentrate to 90% minus 325 mesh was required for further liberation of silica and pyrite. Concentrate was shipped to the Port of Melilla by train for export.

Lead and Zinc.—Operations were recommenced at the Sidi Lahcen Mine by Ste. Minière de Sidi Lahcen. BRPM controlled 60% and the Arab Mining Co. of Jordan, 40%. Proved reserves were reported at 1 million tons containing 6% lead, 0.8% zinc, and 3.9 troy ounces of silver per ton. Initial production was to be about 5,600 tons per year of 74% lead concentrate and 1,400 tons per year of zinc concentrate. Silver content of the lead and zinc concentrates was expected to be about 45 troy ounces per ton and 16 troy ounces per ton, respectively.

A $15 million project was underway to expand lead and zinc production by Centrale d'Achat et de Developpment de la Region Minière du Tafilalet et de Figuig (CADETAF), a mining cooperative for small mines and artisanal workers in the Provinces of Errachida, Figuig, and Ouarzazate. The World Bank supplied CADETAF with a $10 million loan repayable at 6% interest over 17 years with a 4-year grace period.

Manganese.—Output by S.A. Cherifienne d'Etudes Minières (SACEM) at the Imini Mine was approaching an end owing to exhaustion of ore reserves. The mines were shallow, having mainly friable ore that was broken by pnuematic drills, lashed into cars, and raised to the surface in sets of two cars. Five grades of ore were mined underground, marked, and recorded at relay points. Wood from northern Morocco and the Anti-Atlas Mountains was used for cribbing and support. A retreat system of mining was employed to salvage as much timber as possible for reuse owing to its limited availability. Mines that were no longer profitable for large-scale mining were leased to small workers. No premixing of ore occurred at the mill. Concentrates

were produced separately, then mixed for three salable products. About 400 people were employed at the operation; 100, underground. Total production has been about 100,000 tons per year of concentrate grading 60% MnO_2.

Silver.—Silver was produced as a byproduct of lead, zinc, and copper ores, and as a primary product from the Imiter Mine in Ouarzazate Province. Mineralization occurred in Precambrian pelite as argentite, tetrahedrite, and native silver, the latter as plates and sheets in dolomite. Production was by the Société Metallurgique d'Imiter at the rate of 150 tons per day of ore averaging 16 troy ounces per ton. Plant operations included two-stage crushing, classification, flotation, countercurrent leaching, precipitation, and pressing. The precipitate was then retorted. Native silver was melted in a crucible and ladled into water to produce granules. Total production was about 800,000 troy ounces per year of 99.99% silver. Known reserves were sufficient for 10 years at current production levels, but proved and probable reserves were large and close to being classified as known.

The Zgounder Mine, located in Taroundant Province, commenced operations at yearend. Mineralization was similar to that of the Imiter Mine, but was predominately argentite and native silver in small sheets. Plant operations were also similar to that at Imiter with the Merrill-Crowe process being used. The treatment plant was furnished by Hungary. The plant was to treat 73,000 tons per year of ore for production of 1,028,800 troy ounces per year of silver metal. Total investment cost was $9.8 million. About 170 people were employed at the site. BRPM owned 60% and Arab Mining owned 40% of Société Metallurgique du Djebel Siroua, which operated the mine and plant.

NONMETALS

Barite.—Barite was produced from numerous areas throughout the country, primarily from vein deposits in Cambrian limestones, schists, and quartzites. Association with lead, zinc, and silver was also common, and barite was produced as a byproduct at Zaida from lead output. Nearly all production was exported, both as crude and ground barite. The United States was the principal recipient, followed by Norway, the United Kingdom, and Mexico.

About 15 companies produced barite from 22 deposits. Total production capacity was about 550,000 tons of barite per year. Cie. Marocaine des Barytes (COMABAR) had a crushing capacity of 100,000 tons per year at Djebel Ighoud and 250,000 tons per year at Zelmou. Other producers included Ste. de Developpment Industriel et Minière de le Haute Moulouya (SODIM), SACEM, and Ste. Minière des Barytines d'Asni. BRPM owned 50% of COMABAR, 50% of SODIM, and 47.1% of SACEM. SACEM had a production capacity of 82,000 tons per year at three areas: Western High Atlas, Near Imini, and at Khenifra. A fourth operation at Taza with 30,000 tons per year capacity was under development. SACEM's stockpile capacity included 10,000 tons at the Sekasaoua Mine in the Western High Atlas, 10,000 tons at the Port of Agadir, and 20,000 tons at an intermediate point. Output from Imini was shipped through the Port of Safi. Loading capacity at the ports of Agadir and Safi was 1,500 tons per day each. Output by SACEM from Khenifra was trucked to Oued Zem for transshipment by rail to Casablanca. Port capacity at Casablanca was 1,000 tons per day of barite.

Cement.—Both production and capacity continued to increase in the cement industry, although the production goal of 7.6 million tons of cement was not met. Total capacity was about 5 million tons. A new cement plant by Société Nouvelle de Casablanca was under construction near Casablanca with a capacity of 1.2 million tons. Eight companies produced cement, the largest being Lafarge Maroc and Cimenterie de l'Oriental. Exports and imports of cement were minimal because Morocco was able to produce and utilize nearly all of its output for local use. Cimenterie de l'Oriental and Ciments d'Agadir were converting from oil- to coal-fired facilities.

Fluorspar.—Société Anonyme des Entreprises Minières was the sole producer of fluorspar and had a capacity of about 70,000 tons per year of flotation concentrates. Output from the El Hamman Mine near Meknes was nearly all exported as acid-grade fluorspar.

Phosphate Rock.—Progress continued in the phosphate sector with full commissioning of Maroc Phosphore II and the tendering of contracts for new phosphoric acid lines at Jorf Lasfar, where Maroc Phosphore III is located. However, full capacity utilization at Maroc Phosphore II was not reached owing to low demand worldwide. The Maroc Phosphore II facility consists of three phosphoric acid units of 550 tons per

day capacity as P_2O_5, four phosphoric acid concentrators with 400 tons per day capacity, and three sulfuric acid plants each with a capacity of 1,750 tons per day. Rock was supplied from the Ben Guerrir Mine, which had a capacity of 2 million tons per year.

Jorf Lasfar was to have six 2,300-ton-per-day sulfuric acid units and eight 500-ton-per-day P_2O_5 phosphoric acid units. Total rock utilization would be about 5 million tons per year at full production, supplied primarily by mines at Khouribga. Phosphoric acid units may eventually be installed at Nador, in northeast Morocco, for Maroc Phosphore IV. Full operation of the three complexes should provide for processing of 10 million tons per year of phosphate rock or about one-third of total rock output.

Production resumed at the Bu Craa Mine in Western Sahara at the rate of about 500,000 tons per year. Production had been intermittent since 1975 owing to insecurity, ceasing completely in 1980. All production was exported for processing.

MINERAL FUELS

Bituminous Shale.—Construction commenced on a pilot retorting plant at Timahadite in the Middle Atlas. The plant represented a scale-up from earlier tests and was to be a semicontinuous batch process with two furnaces having an hourly capacity of up to 4.4 tons of shale.

Natural Gas.—A loan of $75.2 million was obtained from the World Bank for continuation of assessment of the Essaouira Basin where natural gas was discovered in late 1981. Three appraisal wells were underway with a total of nine such wells planned for full testing of the basin's economic potential. Plans for utilization of the gas in powerplants, cement plants, sugar mills, a copper refinery, and other uses were being made.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Moroccan dirhams (DH) to U.S. dollars at the rate of DH5.10 = US$1.00 in 1982.

The Mineral Industry of Namibia

By Miller W. Ellis[1]

Namibia maintained its position as the fourth largest producer of nonfuel minerals, in terms of value, on the African continent. It also remained the world's third largest producer of gem diamonds, after the Republic of South Africa and the U.S.S.R., and ranked fifth in the production of uranium. Most of the country's mineral output was produced by three companies: Consolidated Diamond Mines (Pty.) Ltd. (CDM), a major subsidiary of De Beers Consolidated Mines Ltd.; Rossing Uranium Ltd. (RUL), managed by the British firm Rio Tinto-Zinc Corp. Ltd. (RTZ); and Tsumeb Corp. Ltd. (TCL), managed and 29.6% owned by Newmont Mining Corp. of the United States, with another U.S. company, AMAX Inc., holding 30.2% until August. The fourth largest mineral interest operating in Namibia was the South African Iron and Steel Industrial Corp. Ltd. (Iscor), whose subsidiary companies, Imcor Zinc (Pty.) Ltd. and Industrial Minerals Mining Corp. (Pty.) Ltd., operated the Rosh Pinah lead-zinc mine and the Uis tin mine, respectively.

The gross value of mineral production was approximately $1 billion[2] as compared to a gross domestic product of $1.6 billion. Diamonds accounted for about $450 million, and uranium, $350 million, while TCL's gross sales were reported as $105.6 million. Mineral commodities made up about 65% of the total exports from the country, and the mineral industry taxes provided substantially less than the 60% of public revenue collected in previous years. Tax revenue from the Uis operation was estimated at $220,000 for 1982, and Iscor claimed payment of $1,955,000 in taxes on behalf of Rosh Pinah. CDM continued to be Namibia's largest source of tax revenue, paying a normal rate of 50% on taxable income derived from diamond mining, plus 10% duty on the value of diamonds exported and 15% profit tax on diamonds from specified areas. TCL's normal tax rate was 40%, but the company's carry-forward tax loss of $25 million at yearend 1981 had increased to $27 million during 1982. RUL became liable for tax in 1982 after paying off its loans and recovering the $380 million allowance for startup costs. In all cases, most of the tax revenue has been a direct function of profitability, and, with increasing wage scales and general inflation of production costs, the mineral industry taxes for the year ending March 31, 1982, amounted to approximately $55 million, compared with $170 million paid during 1981.

The makeup of multinational firms operating within the country shifted noticeably from North American to South African ownership. Falconbridge Ltd., formerly Falconbridge Nickel Mines Ltd. of Canada, completed the sale of its 74.9% interest in the Oamites Mining Co. (Pty.) Ltd. to the Metorex Mining Co. of the Republic of South Africa on December 15 for approximately $900,000. Falconbridge recorded a loss of $2.3 million on the sale. Selection Trust Ltd., one of TCL's shareholders, was taken over by British Petroleum Co. Ltd. as a subsidiary, BP Minerals International Ltd. (BPM). On August 12, the TCL directors resolved to increase the company's share capital to 10 million shares. On August 16, a rights issue offered the shareholders new shares at par value on a 1 to 1 basis with existing shares. Gold Fields of South Africa Ltd. (GFSA) and Newmont undertook to purchase all unsubscribed shares. Both Newmont and BPM subscribed

their allocation of the new issue, and, by taking up the unsubscribed remainder, GFSA became a major partner in TCL. At yearend, TCL shareholders were Newmont, 29.6%; GFSA, 27.5%; AMAX, 15.1%; BPM, 14.2%, O'okiep Copper Co. Ltd., 4.7%; and most of the remaining shares were held by companies affiliated with Anglo American Corp. of South Africa Ltd.

GFSA acquired 100% of the British firm Berg Aukas Ltd., whose zinc-lead-vanadium mine of the same name was idle during the year, 52% of Namibia Mines (Pty.) Ltd., and 100% of Trekkopje Exploration and Mining Co. (Pty.) Ltd. and its uranium prospects near Swakopmund. GFSA also maintained its Kiln Products Ltd. subsidiary, renamed Gold Fields Namibia Ltd., which became the holding company for the British firm, South-West Africa Co. Ltd., whose Namibia operations closed down in 1978. In March, Barlow Rand Ltd. (BRL) announced that its wholly owned Namibian subsidiaries would henceforth operate under the name Sonnex. BRL had investments of more than $20 million in Namibia, a local staff of 700, and disbursements that included more than $8 million in salaries and benefits annually.

The mining industry employed nearly 20,000 workers or about 6% of the country's labor force. The migration of skilled and experienced mining and technical staff out of the territory continued. Interviews by recruitment teams from the South African firms were directed chiefly at artisan-grade employees.

Table 1.—Namibia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
METALS[3]					
Arsenic, white[4]	2,401	2,221	1,288	1,370	1,895
Cadmium: Metal, refined	79	81	69	--	110
Copper:					
Mine output, metal content of concentrate[5]	39,000	44,800	42,300	46,185	[e]55,600
Metal, blister	45,919	42,707	40,004	39,719	49,767
Lead:					
Mine output, metal content of concentrate	34,800	44,200	50,200	46,900	[e]33,000
Metal, refined	39,512	41,695	42,654	41,729	40,590
Silver: Mine output, metal content of concentrate[6] thousand troy ounces	1,866	3,617	3,365	2,736	2,812
Tin: Mine output, metal content, recoverable	1,250	1,042	1,070	1,228	1,326
Tungsten: Mine output, metal content, recoverable[e]	150	165	150	--	--
Uranium, U_3O_8 content	3,175	4,518	4,763	4,681	4,454
Vanadium: Mine output, metal content[e]	440	--	--	--	--
Zinc: Mine output, metal content[7]	36,600	23,300	31,908	29,600	[e]32,200
NONMETALS					
Diamond:[8]					
Gem[e] thousand carats	1,803	1,570	1,482	1,186	963
Industrial[e] do	95	83	78	62	51
Total do	1,898	1,653	1,560	1,248	1,014
Lithium minerals[9]	NA	NA	NA	1,263	990
Salt	[e]230,000	[e]230,000	[e]230,000	[9]193,000	[9]184,000
Sulfur: S content of pyritic concentrate	3,013	3,538	3,692	8,361	58,209

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through June 30, 1983.

[2]In addition to the commodities listed, Namibia, prior to 1967, produced bismuth concentrates, cesium ore, columbite-tantalite concentrates, gold, manganese ore, molybdenum concentrates, graphite, lime, mica, precious stones, kyanite, sillimanite, and a variety of crude construction materials (clays, stone, and sand and gravel). No official statistics have been published since yearend 1966, and available information is inadequate to ascertain whether production has been continued or not and, if so, at what levels.

[3]Data are compiled from operating company reports as follows: Tsumeb Corp. Ltd. (TCL) (arsenic, white; refined cadmium; mine and refined lead; mine silver; mine zinc; and pyrite concentrate); South-West Africa Co. Ltd. (SWACO) (mine lead, mine tin, mine tungsten, mine vanadium, and mine zinc); South African Iron and Steel Industrial Corp. Ltd. (Iscor) for Imcor Zinc (Pty.) Ltd.'s Rosh Pinah Mine (mine lead and mine zinc) and for Iscor's own Uis Mine (mine tin); General Mining and Finance Corp. Ltd. for Klein Aub Koper Maatskappy Bpk.'s mine near Rehoboth (mine copper and mine silver); Rio Tinto-Zinc Corp. Ltd. (RTZ) for Rossing Uranium Ltd.'s Rossing mine (uranium concentrate); and Falconbridge Nickel Mines Ltd. for Oamites Mining Co. (Pty.) Ltd.'s mines (mine copper). Data from TCL, RTZ, and Falconbridge are for calendar years; data from other companies are for fiscal years ending June 30 of that stated.

[4]White arsenic equivalent of all arsenic products reported as being produced.

[5]Figures comprise reported production of TCL, Oamites and Otjihase plus estimates for Klein Aub.

[6]Figures comprise reported production of TCL plus estimates for Oamites, Rosh Pinah, and Klein Aub.

[7]Figures comprise reported production of TCL, estimate for SWACO for 1978, and estimates for Rosh Pinah.

[8]Total figures reported by De Beers Consolidated Mines Ltd. in company annual reports for calendar years. Detail on gem and industrial diamonds are estimates, assuming output to be 95% gem quality.

[9]Figures reported by the Chamber of Mines of South West Africa/Namibia.

The South African Government announced the inclusion of $923 million in economic aid to Namibia for the financial year ending March 30, 1983. The South West Africa Water and Electricity Corp. continued to operate the Ruacana hydroelectric plant and to supply the national grid with power. The Van Eck thermal power station near Windhoek was able to remain on standby most of the year, with a savings of 1,000 tons of coal per day. Power generation had not been affected by the widespread drought over most of southern Africa, which had reduced the irrigation capability of most of Namibia's water storage reservoirs by 55% to 95%.

PRODUCTION AND TRADE

De Beers reported a 2.5% increase in the prices of uncut gem diamonds in September 1982 following increased demand for small and intermediate sizes of gem stones. Diamonds continued to be marketed through De Beers Central Selling Organization and were exported to the Republic of South Africa and overseas. RUL's uranium production continued to be exported from Walvis Bay in fulfillment of long-term contracts in Western Europe and Japan. TCL's smelter products were transported via the South African Transport Services Railroad to the loading facilities at Walvis Bay. Sales included 36,494 tons of blister copper, 37,804 tons of refined lead, and more than 2.8 million troy ounces of silver. Small quantities of cadmium and arsenic trioxide were also exported, but local inventories of refined lead, cadmium, and arsenic trioxide were in excess of sales commitments at yearend. Mineral imports included petroleum products, steel for construction, and manganese ore for the extraction of U_3O_8 concentrated from RUL's uranium ore, all from the Republic of South Africa.

COMMODITY REVIEW

METALS

Copper.—TCL continued to be the country's largest producer of copper and silver. Ore output at Tsumeb, TCL's oldest mine, was only 385,118 tons in 1982, 22% below 1981 production. The Tsumeb West section and the upper levels of the mine remained dormant, although small quantities of stockpiled ores from these sections were treated. Mining of Tsumeb's lower section was halted in July, but development of a new ore and waste bypass system from 40 level to 44 level was started. The polymetallic ore contained 3.24% copper plus lead, zinc, silver, and minor arsenic and cadmium. The Tsumeb mill output was 16,937 tons of copper concentrate containing 35% copper and 34 troy ounces of silver per ton. The nearby Kombat mill treated 253,364 tons of ore containing 4.10% copper from the Kombat and Asis West Mines and produced 24,720 tons of copper concentrate with 36% copper and 11.3 troy ounces of silver per ton. The Asis West Mine also produced 38,065 tons of 5.15% copper ore on behalf of part owner Tsumeb Exploration Co. Ltd. (TECO), from which the Kombat mill extracted 4,693 tons of copper concentrate with 38% copper and 9.3 troy ounces of silver per ton. TCL's Matchless Mine, 42 kilometers south of Windhoek, produced 122,741 tons of pyritic ore containing 2.25% copper and 12.54% sulfur, from which the Matchless mill extracted 12,397 tons of copper concentrate containing 21% copper, 33% sulfur, and 2.5 ounces of silver per ton.

The Otjihase Mine, 27 kilometers northeast of Windhoek, became TCL's largest ore and copper producer with 769,290 tons of 1.95% copper ore. The Otjihase mill recovered 61,193 tons of copper concentrate containing 23% copper, 34% sulfur, and nearly 2 troy ounces of silver per ton. It also produced 108,818 tons of pyritic concentrate, containing nearly 50% sulfur, which was sold to RUL for its sulfuric acid plant. TCL's No. 1 copper smelter produced 25,562 tons of argentiferous blister copper from TCL concentrate, 438 tons from purchased concentrate, and 4,492 tons from other mines' concentrates smelted on toll. The No. 2 smelter operated largely on Otjihase's concentrate from which 12,778 tons of blister copper was recovered. Copper from other producers' concentrates yielded 6,497 tons of blister copper for a total of 49,767 tons of blister copper output for Namibia in 1982, an increase of 25% over that of 1981.

Falconbridge reported ore reserves for its Oamites at 2,027,000 tons of 1.13% copper ore at yearend 1981. Operations at its Swartmodder Mine were suspended in March 1982, and ore production at the nearby Oamites Mine, 55 kilometers south

of Windhoek, was reduced from 45,000 to 35,000 tons per month. Oamites ore production for 1982 was estimated at 400,000 tons containing about 4,500 tons of copper. This is approximately equal to the amount toll smelted through the Tsumeb No. 1 copper smelter. The silver content was estimated at 200,000 troy ounces. Falconbridge closed its Windhoek exploration office during 1982 and sold Oamites to Metorex of the Republic of South Africa at yearend.

Copper-silver ore and concentrate were also produced by General Mining Union Corp. Ltd.'s subsidiary, Klein Aub Koper Maatskappy Bpk., from its mine and mill located about 100 kilometers south of Rehoboth.

Lead and Zinc.—TCL was the country's largest lead producer and the second largest producer of zinc. Its Tsumeb, Kombat, and Asis ore bodies were complex sulfide deposits containing lead, zinc, copper, cadmium, arsenic, and other valuable constituents as well as silver. TCL's 385,118 tons of ore contained 6.67% lead and 1.84% zinc, from which the Tsumeb mill extracted 63,511 tons of lead concentrate containing 20,774 tons of lead and 520,691 troy ounces of silver. It also produced 1,412 tons of zinc concentrate with 702 tons of zinc and 14,845 troy ounces of silver. The Kombat mill produced 5,414 tons of lead concentrate with 1,476 tons of lead and 15,666 troy ounces of silver from 253,364 tons of 1.98% lead ore produced by the Kombat and Asis West Mines. It also produced 281 tons of lead concentrate from 38,065 tons of 1.46% lead ore from the Asis West Mine on behalf of TECO. The concentrate contained 86 tons of lead and 623 troy ounces of silver. TCL's lead smelter produced 30,609 tons of refined lead from TCL sources, including 6,710 tons derived from various stockpiles of intermediate polymetallic mill and furnace products. The remaining 9,981 tons of refined lead was from concentrates purchased from other operators or smelted on toll. TCL's metallurgical plant also produced 1,895 tons of arsenic and 110 tons of cadmium from smelter flue dust and other metallurgical products.

The Rosh Pinah open pit mine, in the edge of the Namib Desert 27 kilometers north of the Orange River, was the country's largest zinc producer and was second in production of lead. The Rosh Pinah operation was owned and managed by Imcor Zinc, a subsidiary of Iscor. Its concentrator produced 54,500 tons of zinc concentrate and 13,800 tons of lead concentrate in fiscal 1981-82. Both concentrates were trucked 160 kilometers northwest to Aus, and the zinc concentrate was railed to Iscor's Vanderbijlpark steel plant in the Republic of South Africa to be used in the galvanizing section. The lead concentrate was railed to TCL for smelting and refining. The Rosh Pinah concentrates contained an estimated 604,500 troy ounces of silver. Iscor's exploration team reported that promising indications of lead, copper, and zinc, found north of Rosh Pinah, were being examined.

Manganese.—SWA Manganese (Pty.) Ltd.'s Otjosondu Mine, 100 kilometers northeast of Okahandja, failed to attract any bidders when it was offered at auction in Windhoek during late September. However, the buildings, machinery, and equipment were sold for $86,000. The liquidator and trustee for the property was trying to find a buyer for the property. RUL advertized that it had tested 100 tons of Otjosondu manganese ore and found it unsatisfactory for use in its uranium extraction process.

Tantalum, Tin, and Tungsten.—The Uis tin mines, located northeast of Swakopmund and operated by Iscor, produced 1,155 tons of cassiterite, tin concentrate, during the 1981-82 fiscal year, compared with 1,220 tons during fiscal 1980-81. The concentrate was shipped to the electrolytic tinplate section of Iscor's Vanderbijlpark steelworks in the Republic of South Africa. Columbite-tantalite concentrate was shipped overseas, converted to ferrocolumbium, ferrotantalum, and tantalum pentoxide, which were reimported by Iscor as required. The Brandberg and Krantzberg tin and tungsten mines remained closed. Exploration and assessment of tantalite deposits in the southeastern part of the country attracted some attention from subsidiaries of the U.S. firms Utah International and Metallurg Inc. The South African firm Natresco (Pty.) Ltd., was also examining the tantalite deposit and was seeking partners to finance a mining operation.

NONMETALS

Diamond.—CDM's Orangemund operations treated 10,018,000 tons of alluvial ore containing 10.13 carats per 100 tons and recovered 1,014,464 carats of diamonds in 1982, a drop of about 20% in both ore and diamond production. Overburden stripping totaled 18.4 million tons in 1982, less than one-half that stripped in 1981, but the

bucket wheel excavator handled more than 25% of the spoil compared with about 13% in 1981. Mining extended 120 meters seaward of the high-water mark and reached a depth of 13 meters below mean sea level. CDM was awarded the maximum rating for safety by the National Occupational Safety Association for the fourth straight year and also received the intermine shield for improved accident frequency-severity rate from the Chamber of Mines of South West Africa/Namibia.

Fertilizer Material (Guano).—Guano continued to be harvested each year from at least seven of Namibia's offshore islands. The largest, Possession Island, had a permanent staff in residence, but the other islands were uninhabited except for guano scraping crews, which visited them briefly each year. Ownership of some of these islands was claimed by South African companies, whose title goes back to the early 1900's. The annual guano harvest was sold in the Cape Town vicinity where it was eagerly sought. The annual value was estimated at $200,000.

Lithium Minerals.—SWA Lithium Mines (Pty.) Ltd., a subsidiary of Metramco Ltd. of the Republic of South Africa, part of the Klöckner Group of the Federal Republic of Germany, was reportedly continuing to extract about 1,000 tons per year of amblygonite, lepidolite, and petalite from the Rubicon and Helicon Mines near Karibib. Lithium concentrates were shipped to glass and ceramics manufactures in the United Kingdom and Western Europe.

MINERAL FUELS

Coal.—CDM Exploration Ltd. reported that drilling had commenced near Aranos to delineate a coal deposit underlying part of its 9,000-square-kilometer concession area between the Nossob River and the Botswana border. The steam-coal-quality seams were reportedly 2 meters thick and at a depth of about 300 meters.

Petroleum.—Namibia's refined petroleum supplies were imported, mostly from the Republic of South Africa. The Government-owned South West Africa Oil and Exploration Corp. (Pty.) Ltd. was responsible for granting oil exploration concessions, and its affiliated company, Southern Oil Exploration Corp. (Pty.) Ltd., held offshore concessions south of Walvis Bay.

Uranium.—RTZ's Rossing Uranium mine, northeast of Swakopmund, has been called the world's largest open pit uranium mine. It produced 15.69 million tons of ore and recovered 4,454 tons of U_3O_8 concentrate in 1982, slightly less than the comparable figure for 1981. Low operating costs continued to be a feature of the operation, resulting in a pretax profit of $160 million, an increase of 45% over the 1981 profit. Much of the increase was due to the depreciation of the South African rand in respect to the U.S. dollar in which the uranium concentrate price is quoted. Most of RUL's contracts were long term and not liable to be affected by low uranium prices, but one of its largest customers, the United Kingdom Central Electricity Generating Board, stated that it will not renew its contract in 1984. A 1982 study by the Massachusetts Institute of Technology for the U.S. Department of Energy reported that a French contract was for the delivery of 11,080 tons of U_3O_8 from 1977 to 1990 and that Urangesellschaft mbh and Veba AG of the Federal Republic of Germany were committed to buy 6,140 tons from 1975 to 1986. The Chebu and Kansai power utilities of Japan were the largest contractors, with an order for 30,000 tons from 1977 to 1990. The Iranian contract for 10,670 tons from 1978 to 1990 was suspended by the Khomeini Government in 1979 after the delivery of 200 tons. Development of other uranium deposits in the vicinity of Rossing remained in abeyance because of low prices and the uncertain political situation, but no ground was relinquished.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from South African rand (R) to U.S. dollars at the rate of R1 = US$1.1490 for 1981 and R1 = US$0.9228 for 1982.

The Mineral Industry of the Netherlands

By George A. Rabchevsky[1]

The recession that started in 1980 continued in the Netherlands through 1982. Consumption and investment were down by 2% in real terms and unemloyment had risen to a new postwar record of 16% in December. In general, the economy had lagged behind many other European industrial countries since the first oil crisis of 1974. Compounding those problems was the Netherlands industrial base, which was heavily oriented towards energy-intensive products, such as oil refining, natural gas, and petrochemicals, in a period when world energy consumption was declining.

Industrial production remained almost unchanged from the previous year, while exports increased. Because of a sharp slowdown in energy demand, there was a decline in the production and export of natural gas, the only natural domestic fuel available to the Netherlands. The gross national product (GNP) dropped by 1.5% in real terms, but because of the strong export market, the country registered a surplus of $4.8 billion[2] in the balance of payments. The generous social welfare system, however, had led to a steady rise in Government expenditures. The control of the burgeoning Government deficit had, in 1982, become the principal focus of Government policy, which was aimed at restructuring the economy. The immediate prospects were gloomy and it was estimated that reforms would take a few years to show positive results. The outlook for 1983 was for unemployment to rise to 13% and GNP to remain the same as in 1982, or perhaps decline slightly. Toward the end of restructuring the economy, a company for industrial projects was established in the fall of 1982 as a means for Government participation in the early stages of innovative projects. Its purpose was to relieve the shortage of investment capital and to direct expansion into promising technological fields. The Government also lowered electricity prices to industry, providing certain tax relief and reduced environmental regulations.

PRODUCTION

The Netherlands in 1982, as in previous years, relied almost totally on imports for natural resources. It was, however, the largest producer of natural gas in Europe. The country was also an active producer of processed commodities such as aluminum, zinc, and steel. Production in the metals and mineral fuels industries was stagnant in both 1981 and 1982, with gains reported only in the generation of nuclear power.

Table 1.—Netherlands: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal:					
Primary	261,164	257,719	258,621	261,983	[3]250,925
Secondary	43,991	46,643	47,133	50,217	[3]49,000
Cadmium metal	402	416	455	518	485
Iron and steel:					
Sintered ore (from imported ore) thousand tons	3,012	2,929	2,723	3,042	3,600
Pig iron do	4,613	4,814	4,328	4,600	[3]3,617
Crude steel do	5,590	5,806	5,272	5,472	[3]4,349
Semimanufactures do	4,732	4,993	4,475	4,732	[3]3,886
Lead metal:					
Smelter[e]	500	6,800	6,000	2,500	2,500
Refined:					
Primary	18,172	16,432	13,902	7,015	7,530
Secondary	13,700	14,700	13,900	16,000	16,000
Total	31,872	31,132	27,802	23,015	[3]23,530
Tin metal, refined:[e]					
Primary	1,600	1,445	1,370	2,500	2,520
Secondary	180	180	180	180	180
Zinc metal (slab), primary	135,399	153,982	169,539	177,363	[3]186,022
NONMETALS					
Cement, hydraulic thousand tons	3,918	3,701	3,745	3,500	3,600
Nitrogen: N content of ammonia do	2,148	1,916	1,874	1,917	[3]1,652
Salt, all types do	2,939	3,951	3,464	3,578	[3]3,191
Sand, industrial do	23,500	23,033	24,608	24,600	38,450
Sodium compounds:					
Sodium carbonate do	280	[e]420	[e]420	420	420
Sodium sulfate, synthetic do	50	50	50	50	50
Sulfur:					
Elemental byproduct:					
Of metallurgy[e] do	60	[r]88	[r]90	90	75
Of petroleum do	[r]65	[r]70	52	55	39
Total do	[r]125	[r]158	142	145	114
Sulfuric acid, 100% H_2SO_4 do	[r]1,600	1,744	1,726	1,700	1,650
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	86,800	93,000	95,300	85,400	82,700
Coke thousand tons	2,401	2,528	2,455	2,242	[3]2,428
Gas:					
Manufactured, all types[4] million cubic feet	264,531	233,553	210,011	208,552	[3]185,814
Natural:					
Gross do	3,133,456	3,407,425	3,219,023	2,988,165	[3]2,543,844
Marketed do	NA	NA	3,266,842	3,240,000	3,000,000
Natural gas liquids thousand 42-gallon barrels	1,003	2,253	3,162	6,816	6,000
Peat[e] thousand tons	400	400	400	400	400
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	9,556	8,970	8,724	10,950	11,600
Refinery products:					
Gasoline:					
Aviation do	1,157	907	774	500	500
Motor do	60,588	69,352	61,821	55,939	[3]62,008
Jet fuel do	21,728	28,832	27,112	24,064	[3]26,824
Kerosine do	3,860	4,270	3,658	3,061	[3]3,410
Distillate fuel oil do	139,726	148,133	130,632	104,149	[3]101,613
Residual fuel oil do	124,475	121,319	99,707	96,000	95,000
Lubricants do	4,200	3,955	3,955	3,955	3,950
Bitumen do	53,363	5,563	5,327	5,300	5,200
Liquefied petroleum gas do		13,897	10,730	10,500	10,400
Other do		44,288	31,509	30,000	30,000
Refinery fuel and losses do	17,807	29,864	24,971	24,000	24,000
Total do	426,904	470,380	400,196	357,468	362,905

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through July 13, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (clays, stone, and gravel) presumably is also produced, but output is not reported and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Coke oven and blast furnace gas only.

TRADE

Total exports increased in 1982 and made up more than 50% of the Netherlands GNP. The Netherlands, in general, also remained an affluent and attractive market. U.S. exports to the Netherlands were up by about 8% from those of 1981, and the United States fared better in the Netherlands market than in other European markets. The United States had a trade surplus with the Netherlands in 1982, with sales of $8.5 billion; this was the third largest U.S. market in Europe and the sixth largest in the world. The gains were in large part due to U.S. administrative actions and to the Netherlands port trade; U.S. lead, for example, was routed through Rotterdam because British warehouses were filled. Netherlands import of mineral fuels from the United States in 1982 rose 128%, following the lifting of U.S. restrictions on fuel oil exports, and the General Services Administration authorized sales of tin and nickel from the National Defense Stockpiles. U.S. exports of coal to Rotterdam continued at high levels.

Table 2.—Netherlands: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium, oxides and hydroxides	34	70	NA	France 34; West Germany 33.
Alkaline metals	20	14	--	West Germany 12; United Kingdom 1.
Aluminum:				
Ore and concentrate	13,441	12,502	--	West Germany 7,531; Sweden 1,310; Egypt 990.
Oxides and hydroxides	51,856	40,331	2	West Germany 13,787; Italy 6,469; Romania 4,180.
Ash and residue containing aluminum	7,394	6,320	NA	West Germany 4,042; France 2,137.
Metal including alloys:				
Scrap	74,331	74,788	--	West Germany 42,109; France 14,358; Belgium-Luxembourg 13,918.
Unwrought	365,336	351,995	1,931	Belgium-Luxembourg 118,238; France 88,585; West Germany 84,845.
Semimanufactures	106,032	93,617	3,839	West Germany 41,742; Belgium-Luxembourg 14,906; France 12,499.
Antimony:				
Oxides	341	213	--	West Germany 195; United Kingdom 11.
Metal including alloys, all forms	79	21	NA	West Germany 10; France 8.
Beryllium: Metal including alloys, all forms—value	$19,617	$3,607	--	Pakistan $2,004; West Germany $1,603.
Bismuth: Metal including alloys, all forms	31	33	NA	United Kingdom 12; Italy 10; West Germany 7.
Cadmium: Metal including alloys, all forms	404	505	105	Belgium-Luxembourg 185; France 123; West Germany 61.
Chromium:				
Ore and concentrate	18,726	26,577	--	West Germany 7,782; France 4,993; Switzerland 1,426.
Oxides and hydroxides	197	241	--	United Kingdom 161; West Germany 50; Belgium-Luxembourg 12.
Metal including alloys, all forms	3	31	--	All to West Germany.
Cobalt:				
Oxides and hydroxides	48	60	--	West Germany 17; East Germany 7; Hungary 7.
Metal including alloys, all forms	196	48	5	Japan 19; France 12; Austria 5.
Columbium and tantalum:				
Metal including alloys, all forms:				
Columbium (niobium)	6	5	--	All to United Kingdom.
Tantalum	182	4	4	

See footnotes at end of table.

Table 2.—Netherlands: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Copper:				
Oxides and hydroxides	57	87	--	West Germany 50; Denmark 10.
Sulfate	766	754	NA	Belgium-Luxembourg 339; United Kingdom 189; France 95.
Ash and residue containing copper	4,216	6,320	NA	West Germany 4,042; France 2,137.
Metal including alloys:				
Scrap	58,390	57,388	--	West Germany 24,684; Belgium-Luxembourg 23,787; Italy 3,905.
Unwrought	5,945	11,187	5,088	Turkey 2,632; West Germany 1,015; France 744.
Semimanufactures	48,908	50,622	17,385	West Germany 9,468; France 4,114; United Kingdom 3,024.
Germanium: Metal including alloys, all forms—value	$470	$58,112	$31,260	Japan $24,046.
Gold:				
Waste and sweepings value, thousands	$22,756	$24,064	NA	West Germany $9,188; United Kingdom $6,465; Switzerland $4,596.
Metal including alloys, unwrought and partly wrought—troy ounces	922,407	980,798	289	Switzerland 464,711; France 343,887; West Germany 79,317.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	273,619	239,702	--	West Germany 229,891; United Kingdom 6,185; France 1,372.
Pyrite, roasted	87	61	20	Belgium-Luxembourg 24; Australia 14.
Metal:				
Scrap—thousand tons	1,194	1,252	1	West Germany 416; Belgium-Luxembourg 354; Spain 249.
Pig iron, cast iron, related materials	10,507	5,516	(1)	Denmark 2,082; West Germany 1,955; Belgium-Luxembourg 964.
Ferroalloys:				
Ferrochromium	6,641	18,243	--	West Germany 9,741; France 5,570; Belgium-Luxembourg 1,958.
Ferromanganese	351	2,220	--	All to West Germany.
Ferromolybdenum	143	103	--	West Germany 48; France 43; Austria 5.
Ferronickel	(1)	139	--	Spain 111; West Germany 28.
Ferrosilicochromium	--	4	--	NA.
Ferrosilicomanganese	2,022	377	--	All to West Germany.
Ferrosilicon	2,616	2,391	--	West Germany 1,745; United Kingdom 336; France 137.
Unspecified	221	271	--	West Germany 159; Italy 73; France 34.
Steel, primary forms thousand tons	1,799	2,075	258	West Germany 645; Belgium-Luxembourg 318; United Kingdom 219.
Semimanufactures:				
Bars, rods, angles, shapes, sections	424,203	489,472	12,926	Belgium-Luxembourg 129,609; West Germany 108,131; United Kingdom 53,324.
Universals, plates, sheets thousand tons	1,567	1,614	187	West Germany 279; United Kingdom 234; Belgium-Luxembourg 229.
Hoop and strip	118,395	113,542	289	West Germany 59,580; Switzerland 20,965; France 7,988.
Rails and accessories	29,916	37,355	--	Italy 25,376; West Germany 8,383; India 1,470.
Wire	42,330	60,064	4,218	France 15,338; West Germany 11,355; Belgium-Luxembourg 10,566.
Tubes, pipes, fittings	488,899	571,927	19,063	West Germany 124,634; Saudi Arabia 116,817; Belgium-Luxembourg 51,164.
Casting and forgings, rough	23,166	28,294	4	Belgium-Luxembourg 22,990; West Germany 3,758; United Kingdom 928.

See footnotes at end of table.

Table 2.—Netherlands: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides	6,302	6,635	--	West Germany 2,621; Italy 2,548; U.S.S.R. 450.
Ash and residue containing lead	2,846	2,682	--	Belgium-Luxembourg 1,270; West Germany 714; United Kingdom 475.
Metal including alloys:				
Scrap	36,153	33,604	--	West Germany 12,906; France 11,894; Belgium-Luxembourg 5,766.
Unwrought	19,696	13,768	101	West Germany 8,435; Spain 3,193; Belgium-Luxembourg 514.
Semimanufactures	1,782	1,774	3	Norway 740; Belgium-Luxembourg 289; United Kingdom 277.
Magnesium: Metal including alloys:				
Scrap	1,421	1,058	595	Italy 204; West Germany 190; France 45.
Unwrought	4,676	4,571	19	West Germany 2,821; United Kingdom 1,206; Belgium-Luxembourg 316.
Semimanufactures	15	16	--	West Germany 12; Belgium-Luxembourg 4.
Manganese:				
Ore and concentrate, metallurgical-grade	39,536	44,921	--	West Germany 17,636; Republic of South Africa 3,719; Belgium-Luxembourg 2,589.
Oxides	88	116	8	Belgium-Luxembourg 24; Denmark 24; Italy 24.
Metal including alloys, all forms	2,487	3,266	NA	West Germany 1,809; United Kingdom 697; France 152.
Mercury 76-pound flasks	5,482	4,350	87	United Kingdom 1,789; West Germany 783; Italy 609.
Metalloids:				
Arsenic, oxides and acids	33	8	--	NA.
Selenium	2	5	--	West Germany 2.
Silicon	3,397	1,827	--	West Germany 1,737; Switzerland 68.
Tellurium and arsenic, metal	61	9	NA	West Germany 6; France 2.
Molybdenum:				
Oxides and hydroxides	2,247	1,546	--	Austria 967; United Kingdom 181; West Germany 107.
Metal including alloys:				
Scrap	NA	6	NA	West Germany 2; United Kingdom 2; France 1.
Unwrought	NA	19	--	Austria 18.
Semimanufactures	146	124	3	Belgium-Luxembourg 100; West Germany 20.
All forms	35	--		
Nickel:				
Matte and speiss	3,686	2,602	--	West Germany 1,445; France 452; Sweden 255.
Oxides and hydroxides	572	264	--	France 86; Belgium-Luxembourg 60; West Germany 51.
Ash and residue containing nickel	1,504	1,604	NA	Sweden 700; Spain 297; Finland 260.
Metal including alloys:				
Scrap	2,168	1,564	68	Belgium-Luxembourg 342; West Germany 327; Spain 271.
Unwrought	4,446	3,088	--	Italy 1,635; West Germany 606; United Kingdom 214.
Semimanufactures	288	1,088	1	West Germany 943; France 39; Belgium-Luxembourg 35.
Platinum-group metals:				
Waste and sweepings value, thousands	NA	$24,218	--	Belgium-Luxembourg $13,408; West Germany $4,439; France $3,290.
Metal including alloys, unwrought and partly wrought, unspecified troy ounces	40,576	31,829	354	West Germany 12,635; Denmark 3,279; Switzerland 3,022.
Silver:				
Waste and sweepings[2] value, thousands	$58,645	$8,035	--	West Germany $5,566; France $2,147; Belgium-Luxembourg $186.
Metal including alloys, unwrought and partly wrought thousand troy ounces	8,127	3,736	3	West Germany 1,129; France 817; Switzerland 649.

See footnotes at end of table.

Table 2.—Netherlands: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Tin:				
Oxides	7	17	--	Belgium-Luxembourg 9; Taiwan 4; West Germany 3.
Ash and residue containing tin	4,645	2,792	700	West Germany 1,030; United Kingdom 589; Belgium-Luxembourg 426.
Metal including alloys:				
Scrap	361	258	--	West Germany 141; Belgium-Luxembourg 67; United Kingdom 47.
Unwrought	1,945	2,949	100	West Germany 1,291; Belgium-Luxembourg 481; United Kingdom 335.
Semimanufactures	795	723	1	West Germany 388; Belgium-Luxembourg 154; Sweden 52.
Titanium:				
Ore and concentrate	26,386	21,746	--	United Kingdom 4,442; Bulgaria 2,670; West Germany 2,616.
Oxides	831	5,127	--	Belgium-Luxembourg 850; France 617; unspecified 3,020.
Metal including alloys:				
Scrap	NA	86	21	Italy 35; United Kingdom 26.
Unwrought	NA	3	--	NA.
Semimanufactures	37	65	--	France 24; Japan 18; Italy 9.
All forms	40	--		
Tungsten:				
Ore and concentrate	1,656	344	--	West Germany 128; U.S.S.R. 80; Czechoslovakia 52.
Ash and residue containing tungsten	26	28	NA	West Germany 22; Austria 2.
Metal including alloys:				
Scrap	NA	138	51	Austria 28; West Germany 26; United Kingdom 23.
Unwrought	NA	11	1	France 3; West Germany 3; United Kingdom 2.
Semimanufactures	148	151	--	Belgium-Luxembourg 131; France 3; India 3.
All forms	54	--		
Uranium and/or thorium:				
Ore and concentrate value	--	$10,821	--	All to Belgium-Luxembourg.
Metal including alloys, all forms, thorium do	--	$1,603	--	All to West Germany.
Vanadium:				
Ore and concentrate	NA	250	--	All to Belgium-Luxembourg.
Ash and residue containing vanadium	17	8	--	NA.
Zinc:				
Ore and concentrate	7,306	15	--	All to Belgium-Luxembourg.
Oxides	13,625	--		
Blue powder	2,933	3,411	--	West Germany 1,383; France 868; Switzerland 728.
Matte	783	1,028	--	West Germany 738; France 146; Belgium-Luxembourg 144.
Ash and residue containing zinc	r11,071	11,811	NA	Belgium-Luxembourg 7,769; West Germany 3,694.
Metal including alloys:				
Scrap	6,576	14,840	--	West Germany 8,920; France 2,885; Belgium-Luxembourg 2,542.
Unwrought	163,201	162,867	19,967	United Kingdom 39,681; West Germany 28,469; France 22,015.
Semimanufactures	3,815	4,684	--	West Germany 3,149; Belgium-Luxembourg 353; Republic of South Africa 309.
Zirconium:				
Ore and concentrate	24,840	24,414	--	West Germany 13,612; France 5,616; Belgium-Luxembourg 3,109.
Metal including alloys, all forms value	$64,383	$8,416	--	NA.
Other:				
Ores and concentrates	29,159	16,768	--	United Kingdom 3,763; Italy 3,460; West Germany 2,596.
Oxides and hydroxides	r2,160	2,160	485	United Kingdom 524; West Germany 298; France 184.
Ashes and residues	r2,582	1,021	4	Belgium-Luxembourg 315; West Germany 240; France 168.
Pyrophoric alloys	--	2	--	NA.
Cermets	11	16	--	United Kingdom 9; Belgium-Luxembourg 4; West Germany 3.
Base metals including alloys, all forms	r3	2	--	France 1; India 1.

See footnotes at end of table.

Table 2.—Netherlands: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	8,002	6,598	20	Thailand 2,097; West Germany 1,079; Denmark 463.
Artificial: Corundum	411	79	10	Australia 30; Belgium-Luxembourg 27; West Germany 10.
Dust and powder of precious and semi-precious stones, including diamond kilograms	171	103	2	United Kingdom 16; West Germany 14; Sweden 14.
Grinding and polishing wheels and stones	4,118	4,018	35	West Germany 870; United Kingdom 676; Belgium-Luxembourg 467.
Asbestos, crude	36	269	--	West Germany 264; Belgium-Luxembourg 4.
Barite and witherite	122,537	86,411	214	United Kingdom 26,396; Denmark 15,653; Norway 14,489.
Boron materials:				
Crude natural borates	400,154	411,759	--	West Germany 96,241; France 72,125; United Kingdom 58,673.
Oxides and acids	603	919	--	West Germany 597; Egypt 106; Belgium-Luxembourg 50.
Cement	391,278	434,173	--	West Germany 205,861; Nigeria 82,575; Belgium-Luxembourg 66,369.
Chalk	26,757	30,897	--	Belgium-Luxembourg 29,855; Saudi Arabia 627; West Germany 259.
Clays and clay products:				
Crude:				
Anadalusite, kyanite, sillimanite	1,896	547	NA	West Germany 180; United Kingdom 159.
Bentonite	35,210	31,619	NA	Belgium-Luxembourg 10,109; United Kingdom 5,150; Norway 4,034.
Chamotte earth	1,242	1,353	NA	West Germany 1,248.
Dinas earth	--	1	--	NA.
Kaolin	79,203	81,526	NA	Belgium-Luxembourg 68,579; West Germany 8,739; France 3,218.
Unspecified	r80,925	67,013	262	West Germany 39,004; Belgium-Luxembourg 21,327; Norway 2,725.
Products:				
Nonrefractory	852,100	788,714	229	West Germany 593,684; Belgium-Luxembourg 115,320; France 47,114.
Refractory including nonclay brick	33,845	37,954	39	West Germany 11,708; Belgium-Luxembourg 6,917; Italy 3,051.
Cryolite and chiolite	--	(1)	--	All to Belgium-Luxembourg.
Diamond:				
Gem, not set or strung carats	254,736	365,219	26,113	United Kingdom 221,017; Belgium-Luxembourg 31,047; Switzerland 21,482.
Industrial do	833,512	677,168	124,063	Belgium-Luxembourg 231,755; United Kingdom 48,414; West Germany 48,285.
Diatomite and other infusorial earth	657	492	--	Nigeria 164; Belgium-Luxembourg 114; Switzerland 61.
Feldspar, fluorspar, related materials:				
Feldspar	3,501	2,791	--	Belgium-Luxembourg 1,654; Greece 809; France 286.
Fluorspar	765	1,176	--	Sweden 575; Jordan 152; Italy 144.
Unspecified	11,430	21,231	--	West Germany 14,380; Belgium-Luxembourg 2,878; France 2,188.

See footnotes at end of table.

Table 2.—Netherlands: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	106,894	79,985	--	Belgium-Luxembourg 58,674; West Germany 18,424; France 2,234.
Manufactured:				
Ammonia	609,061	408,302	--	Belgium-Luxembourg 284,887; West Germany 63,867; United Kingdom 31,108.
Nitrogenous --thousands tons--	2,882	2,990	184	France 571; India 530; West Germany 408.
Phosphatic	279,071	305,014	--	France 118,157; West Germany 41,136; Belgium-Luxembourg 38,015.
Potassic	5,694	5,684	--	Nigeria 2,442; Sudan 975; Oman 825.
Unspecified and mixed thousand tons--	1,033	1,100	--	France 400; West Germany 145; unspecified 365.
Graphite, natural	515	663	7	West Germany 424; Belgium-Luxembourg 92; East Germany 75.
Gypsum and plaster	2,170	1,500	--	Belgium-Luxembourg 943; United Kingdom 196; West Germany 143.
Halogens:				
Bromine	845	804	--	France 351; Belgium-Luxembourg 203; West Germany 144.
Chlorine	17,592	13,857	--	West Germany 12,727; France 1,117.
Iodine	11	35	--	France 11; Belgium-Luxembourg 9; Egypt 5.
Lime	5,297	3,307	10	West Germany 1,859; Belgium-Luxembourg 508; Saudi Arabia 433.
Magnesium compounds:				
Magnesite	3,738	1,561	NA	Belgium-Luxembourg 577; West Germany 523; Indonesia 139.
Oxides and hydroxides	309	638	NA	West Germany 302; Belgium-Luxembourg 156; France 140.
Other	26,887	26,169	42	West Germany 13,870; France 3,651; Belgium-Luxembourg 1,525.
Mica:				
Crude including splittings and waste	980	3,082	--	Norway 1,544; Oman 450; West Germany 374.
Worked including agglomerated splittings	3	3	--	West Germany 2.
Nitrates, crude	--	255	--	West Germany 227; Belgium-Luxembourg 28.
Phosphates, crude	64,064	26,250	--	Belgium-Luxembourg 19,850; West Germany 5,850.
Pigments, mineral:				
Natural, crude	135	176	93	Saudi Arabia 38; Spain 29.
Iron oxides and hydroxides, processed	7,498	6,637	1,247	West Germany 1,987; France 1,243; Indonesia 622.
Precious and semiprecious stones other than diamond: Natural:				
Gem material kilograms	2,056	6,016	NA	West Germany 4,920; Belgium-Luxembourg 91.
Quartz crystal, piezoelectric do	--	42	--	NA.
Pyrite, unroasted	--	4	--	All to Saudi Arabia.
Salt and brine thousand tons	2,159	2,298	70	Belgium-Luxembourg 609; West Germany 471; Finland 387.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	37,602	1,053	--	France 260; West Germany 246; Denmark 150.
Sodium carbonate, natural and manufactured	154,896	144,501	--	West Germany 44,915; Denmark 14,155; unspecified 68,816.
Sodium hydroxide	37,602	233,206	8,299	Belgium-Luxembourg 42,213; Indonesia 25,484; France 18,493.
Sodium sulfate, natural and manufactured	16,918	14,972	NA	West Germany 4,179; Belgium-Luxembourg 1,899; Denmark 1,789.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7,408	5,804	43	West Germany 4,728; Belgium-Luxembourg 776; Switzerland 63.
Worked	26,949	34,863	--	West Germany 18,017; Belgium-Luxembourg 16,326; Italy 157.

See footnotes at end of table.

Table 2.—Netherlands: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Dolomite, chiefly refractory-grade	15,483	17,473	--	West Germany 9,188; Belgium-Luxembourg 6,563; Switzerland 794.
Gravel and crushed rock thousand tons	4,090	3,607	(1)	Belgium-Luxembourg 3,246; West Germany 359.
Limestone other than dimension	59,942	1,212	--	Belgium-Luxembourg 1,210.
Quartz and quartzite	13,393	14,361	1	West Germany 10,258; Belgium-Luxembourg 1,746; Austria 920.
Sand other than metal-bearing thousand tons	9,341	8,950	--	Belgium-Luxembourg 8,657; West Germany 205; France 64.
Sulfur:				
Elemental:				
Crude including native and by-product	16,038	13,689	--	Belgium-Luxembourg 12,557; France 732; West Germany 332.
Colloidal, precipitated, sublimed	--	5	--	All to Belgium-Luxembourg.
Dioxide	545	734	NA	Belgium-Luxembourg 302; Netherlands Antilles 266; Denmark 106.
Sulfuric acid	143,341	200,876	21	Belgium-Luxembourg 66,867; Spain 63,878; Brazil 28,392.
Talc, steatite, soapstone, pyrophyllite	8,011	14,902	1	West Germany 7,380; Belgium-Luxembourg 1,922; Norway 1,843.
Vermiculite	400	321	NA	West Germany 151.
Other:				
Crude	r196,569	184,049	1	West Germany 75,967; Belgium-Luxembourg 49,321; France 43,532.
Slag and dross, not metal-bearing	246,256	544,822	331	Belgium-Luxembourg 390,085; West Germany 35,341; United Arab Emirates 34,457.
Oxides and hydroxides of barium, magnesium, strontium	1,017	514	82	Belgium-Luxembourg 274; West Germany 125; France 23.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	14,973	28,452	76	Belgium-Luxembourg 13,728; West Germany 6,294; United Kingdom 2,051.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,540	9,844	--	West Germany 9,448; France 340.
Carbon: Carbon black	82,059	88,918	30	France 38,177; West Germany 17,329; Belgium-Luxembourg 14,215.
Coal:				
Anthracite	213,439	250,490	--	West Germany 97,667; Belgium-Luxembourg 60,960; Algeria 53,406.
Bituminous thousand tons	1,334	660	--	Belgium-Luxembourg 315; West Germany 209; Switzerland 70.
Briquets of anthracite and bituminous coal	1,702	939	--	All to Belgium-Luxembourg.
Lignite including briquets	1,689	2,064	--	Do.
Coke and semicoke	751,921	838,873	--	Belgium-Luxembourg 303,680; West Germany 218,142; France 139,685.
Gas, natural million cubic feet	1,931,653	1,752,861	--	West Germany 816,158; France 342,111; Belgium-Luxembourg 311,087.
Gas, manufactured	222,982	202,796	1,749	Belgium-Luxembourg 101,624; Finland 51,222; West Germany 36,474.
Hydrogen, helium, rare gases million cubic feet	(3)	669	NA	West Germany 405; Belgium-Luxembourg 123; France 93.
Peat including briquets and litter	160,432	167,197	--	Belgium-Luxembourg 111,912; West Germany 28,951; France 19,825.
Petroleum and refinery products:				
Crude 42-gallon barrels	100,079	340,421	--	Belgium-Luxembourg 277,079; West Germany 55,984.

See footnotes at end of table.

Table 2.—Netherlands: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	2,561	4,091	NA	West Germany 1,570; Belgium-Luxembourg 1,370; United Kingdom 317.
Gasoline do	r76,204	70,310	3,770	West Germany 40,992; United Kingdom 8,626; Belgium-Luxembourg 7,210.
Mineral jelly and wax do	634	643	5	West Germany 232; United Kingdom 156; France 105.
Kerosine and jet fuel do	r23,802	21,223	86	West Germany 9,596; Denmark 3,573; Sweden 1,824.
Distillate fuel oil do	r100,240	83,559	1,444	West Germany 42,358; Belgium-Luxembourg 13,866; Switzerland 4,476.
Lubricants do	r4,961	5,084	122	Belgium-Luxembourg 1,340; United Kingdom 345; Sweden 329.
Residual fuel oil do	84,491	78,981	147	Belgium-Luxembourg 11,489; West Germany 10,481; United Kingdom 9,563; Bunkers 39,913.
Bitumen and other residues do	2,522	1,767	(1)	West Germany 572; Norway 452; Denmark 371.
Bituminous mixtures do	265	252	(1)	West Germany 141; Belgium-Luxembourg 40; Sudan 31.
Petroleum coke do	396	441	13	West Germany 295; United Kingdom 62; Belgium-Luxembourg 36.
Tars and other crude chemicals derived from coal, gas, and petroleum	827,830	892,702	1,453	West Germany 450,552; United Kingdom 330,882; Belgium-Luxembourg 47,739.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]Quantity in 1980 was 32,745 tons.

Table 3.—Netherlands: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Cesium and rubidium	(1)	11	--	NA.
Lithium:				
Oxides and hydroxides	81	132	20	China 75; U.S.S.R. 22; West Germany 15.
Metal including alloys, all forms	1	2	--	West Germany 1.
Alkaline metals	24	20	--	U.S.S.R. 9; Canada 6; West Germany 2.
Unspecified	137	128	1	West Germany 117.
Aluminum:				
Ore and concentrate	196,261	145,039	754	Greece 132,796; China 5,487; Guyana 4,452.
Oxides and hydroxides	603,900	622,560	263	Greece 219,112; Suriname 215,031; Spain 23,899.
Ash and residue containing aluminum	4,299	3,778	NA	West Germany 2,853; Cuba 357; United Kingdom 161.
Metal including alloys:				
Scrap	44,713	39,589	667	West Germany 16,761; Belgium-Luxembourg 7,027; France 5,012.
Unwrought	215,831	161,349	661	Norway 104,155; West Germany 25,347; United Kingdom 6,312.
Semimanufactures	116,952	95,716	4,556	West Germany 32,736; Belgium-Luxembourg 17,787; France 10,854.
Antimony:				
Oxides	985	907	--	France 276; United Kingdom 240; Bolivia 221.
Metal including alloys, all forms	112	48	NA	Belgium-Luxembourg 31; China 13.

See footnotes at end of table.

Table 3.—Netherlands: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Beryllium:				
Oxides and hydroxides	4	--		
Metal including alloys, all forms	7	1	(1)	Mainly from West Germany.
Bismuth: Metal including alloys, all forms	62	36	NA	Belgium-Luxembourg 10; Peru 5; unspecified 19.
Cadmium: Metal including alloys, all forms	68	118	NA	West Germany 36; Japan 30; China 25.
Chromium:				
Ore and concentrate	27,176	18,188	--	Republic of South Africa 16,387; Finland 1,067; Mozambique 282.
Oxides and hydroxides	790	906	101	West Germany 649; U.S.S.R. 89; Italy 20.
Metal including alloys, all forms	126	46	--	France 22; West Germany 13; United Kingdom 3.
Cobalt:				
Ore and concentrate	NA	18	--	All from United Kingdom.
Oxides and hydroxides	197	194	48	United Kingdom 82; Belgium-Luxembourg 52; France 11.
Metal including alloys, all forms	180	44	2	Sweden 29; West Germany 5; Finland 4.
Colombium and tantalum:				
Ore and concentrate	--	26	--	NA.
Metal including alloys, all forms:				
Columbium (niobium) value	$243,952	$115,021	$46,088	Belgium-Luxembourg $42,482.
Tantalum	2	3	2	Mainly from France.
Copper:				
Ore and concentrate	--	1	1	
Matte and speiss including cement copper	--	126	--	All from West Germany.
Oxides and hydroxides	618	612	6	Italy 295; West Germany 190; Norway 45.
Sulfate	4,401	4,580	NA	Belgium-Luxembourg 1,933; U.S.S.R. 1,248; France 1,080.
Ash and residue containing copper	882	960	NA	West Germany 878.
Metal including alloys:				
Scrap	29,459	37,746	435	West Germany 16,918; France 8,031; United Kingdom 5,710.
Unwrought	21,616	26,164	2,427	Belgium-Luxembourg 8,875; Peru 4,730; Canada 1,917.
Semimanufactures	104,881	70,549	592	West Germany 34,553; Belgium-Luxembourg 16,057; France 9,141.
Germanium: Metal including alloys, all forms value	$293,245	$196,778	$25,248	Belgium-Luxembourg $159,907.
Gold:				
Waste and sweepings value, thousands	$2,247	$2,740	--	Denmark $2,142; West Germany $571.
Metal including alloys, unwrought and partly wrought thousand troy ounces	762	957	NA	United Kingdom 407; Switzerland 167; Republic of South Africa 153.
Hafnium: Metal including alloys, all forms value	--	$4,408	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	7,585	6,659	(1)	Brazil 2,181; Sweden 1,685; Spain 831.
Pyrite, roasted	169	108	--	All from West Germany.
Metal:				
Scrap	153,115	236,805	2,001	West Germany 90,252; United Kingdom 71,883; Belgium-Luxembourg 55,064.
Pig iron, cast iron, related materials	65,005	43,525	4	Brazil 9,998; West Germany 9,129; Belgium-Luxembourg 6,061.

See footnotes at end of table.

Table 3.—Netherlands: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys:				
Ferrochromium	9,461	19,889	NA	Zimbabwe 8,812; Albania 8,184; Bulgaria 896.
Ferromanganese	19,031	19,565	1	Norway 9,953; France 6,503; West Germany 2,593.
Ferromolybdenum	127	126	--	Sweden 45; France 30; Spain 22.
Ferronickel	61	64	--	Dominican Republic 41; West Germany 23.
Ferrosilicochromium	433	99	--	All from West Germany.
Ferrosilicomanganese	6,536	3,606	NA	Norway 1,973; West Germany 843; Republic of South Africa 350.
Ferrosilicon	9,877	7,884	NA	West Germany 2,284; Spain 1,600; Norway 1,567.
Unspecified	r981	695	38	West Germany 206; Sweden 130; Brazil 124.
Steel, primary forms	298,689	282,164	1	Norway 93,347; Italy 91,083; West Germany 64,839.
Semimanufactures:				
Bars, rods, angles, shapes, sections —thousands tons	1,306	1,135	(1)	West Germany 420; Belgium-Luxembourg 393; France 139.
Universal, plates, sheets do	1,057	954	3	Belgium-Luxembourg 429; West Germany 332; France 74.
Hoop and strip	226,496	185,822	144	West Germany 128,064; Belgium-Luxembourg 35,204; France 12,249.
Rails and accessories	45,863	65,389	38	West Germany 57,792; France 6,990; Belgium-Luxembourg 466.
Wire	75,649	103,467	55	Belgium-Luxembourg 47,907; West Germany 43,536; France 7,689.
Tubes, pipes, fittings	758,235	736,236	2,582	West Germany 395,862; Italy 119,349; France 79,181.
Castings and forgings, rough	21,547	23,139	463	West Germany 11,603; Belgium-Luxembourg 7,805; France 800.
Lead:				
Oxides	6,148	3,806	13	West Germany 2,936; Belgium-Luxembourg 773; Mexico 50.
Ash and residue containing lead	r3,315	2,058	81	West Germany 1,158; Italy 296; France 196.
Metal including alloys:				
Scrap	9,752	11,483	452	West Germany 6,399; Belgium-Luxembourg 1,995; Switzerland 960.
Unwrought	62,620	41,392	87	Belgium-Luxembourg 15,616; West Germany 9,077; France 6,695.
Semimanufactures	5,737	5,642	2	Belgium-Luxembourg 3,373; Ireland 1,148; West Germany 994.
Magnesium: Metal including alloys:				
Scrap	838	783	4	West Germany 416; United Kingdom 217; France 81.
Unwrought	5,580	5,441	4,772	France 355; Norway 182; Yugoslavia 80.
Semimanufactures	298	247	1	West Germany 161; Switzerland 24; United Kingdom 23.
Manganese:				
Ore and concentrate, metallurgical-grade	46,779	53,392	--	Belgium-Luxembourg 5,500; France 2,192; unspecified 45,596.
Oxides	1,151	912	14	Belgium-Luxembourg 659; West Germany 159; China 50.
Metal including alloys, all forms	2,558	3,474	81	Republic of South Africa 2,577; Mozambique 459; France 169.
Mercury 76-pound flasks	5,947	4,553	87	Spain 1,914; Japan 1,218; Turkey 493.
Metalloids:				
Arsenic, oxides and acids	24	89	NA	West Germany 26; United Kingdom 24; South Korea 16.
Phosphorus	147	254	--	West Germany 253.
Selenium	7	10	--	Canada 4.
Silicon	5,455	3,306	--	Republic of South Africa 1,394; France 466; Spain 411.
Tellurium and arsenic, metal	59	68	8	France 41; Sweden 7; U.S.S.R. 5.

See footnotes at end of table.

Table 3.—Netherlands: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Molybdenum:				
Oxides and hydroxides	107	83	69	West Germany 10; Austria 4.
Metal including alloys:				
Scrap	NA	2	NA	NA.
Unwrought	NA	87	--	West Germany 62; France 23.
Semimanufactures	146	59	5	Belgium-Luxembourg 39; United Kingdom 12.
All forms	29	--		
Nickel:				
Ore and concentrate	--	1	--	All from France.
Matte and speiss	3,695	2,633	--	Cuba 2,599; Italy 12; Canada 11.
Oxides and hydroxides	1,127	1,075	45	Canada 657; Cuba 261; Spain 58.
Ash and residue containing nickel	501	429	26	West Germany 361; United Kingdom 42.
Metal including alloys:				
Scrap	1,021	1,377	18	West Germany 484; United Kingdom 288; Belgium-Luxembourg 247.
Unwrought	5,567	3,735	10	Republic of South Africa 1,186; United Kingdom 581; U.S.S.R. 541.
Semimanufactures	1,196	1,512	64	Philippines 670; West Germany 414; United Kingdom 279.
Platinum-group metals:				
Waste and sweepings value, thousands	NA	$811	NA	Belgium-Luxembourg $400; Denmark $198; United Kingdom $111.
Metal including alloys, unwrought and partly wrought, unspecified troy ounces	63,174	51,615	6,070	West Germany 12,650; Switzerland 9,713; Belgium-Luxembourg 5,549.
Rhenium: Metal including alloys, all forms value	$235,401	$60,516	--	France $36,470; West Germany $24,046.
Silver:				
Waste and sweepings[2] value, thousands	$9,727	$683	NA	West Germany $432; United Kingdom $196.
Metal including alloys, unwrought and partly wrought thousand troy ounces	6,949	4,619	16	France 1,471; West Germany 1,306; United Kingdom 984.
Tin:				
Ore and concentrate	3,338	6,053	--	Zaire 2,271; Rwanda 1,672; United Kingdom 769.
Oxides	115	96	--	United Kingdom 66; West Germany 18; Italy 10.
Ash and residue containing tin	3,757	1,861	177	Poland 327; France 290; West Germany 175.
Metal including alloys:				
Scrap	402	242	12	West Germany 157; France 21; Italy 21.
Unwrought	5,761	6,353	144	Thailand 2,596; Malaysia 1,035; West Germany 937.
Semimanufactures	128	149	(1)	West Germany 67; Belgium-Luxembourg 51; Denmark 21.
Titanium:				
Ore and concentrate	37,138	24,286	--	Australia 11,062; Sri Lanka 7,281; Republic of South Africa 3,929.
Oxides	5,886	6,371	991	West Germany 3,328; United Kingdom 709; Finland 478.
Metal including alloys:				
Scrap	NA	156	51	France 65; U.S.S.R. 33.
Unwrought	NA	13	2	Japan 10.
Semimanufactures	100	225	43	United Kingdom 94; West Germany 37; Italy 28.
All forms	139	--		
Tungsten:				
Ore and concentrate	232	121	--	Portugal 60; Spain 36; Brazil 25.
Oxides and hydroxides	9	3	--	United Kingdom 2.
Ash and residue containing tungsten	13	93	NA	Portugal 78.
Metal including alloys:				
Scrap	NA	67	NA	West Germany 45; United Kingdom 21.
Unwrought	NA	262	247	West Germany 11; Switzerland 1.
Semimanufactures	102	99	(1)	Belgium-Luxembourg 65; United Kingdom 28.
All forms	40	--		
Uranium and/or thorium: Ore and concentrate value	$503	$6,412	--	All from West Germany.

See footnotes at end of table.

Table 3.—Netherlands: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Vanadium:				
Oxides and hydroxides	14	33	--	China 20; West Germany 8.
Ash and residue containing vanadium	--	308	NA	Republic of South Africa 300.
Metal including alloys, all forms value	$4,024	$15,229	NA	NA.
Zinc:				
Ore and concentrate	346,655	348,713	10,765	Canada 125,779; Ireland 56,447; Australia 54,044.
Oxides	3,836	3,621	23	United Kingdom 1,362; West Germany 1,243; France 557.
Blue powder	2,351	2,350	--	Belgium-Luxembourg 1,196; West Germany 987; Italy 123.
Matte	257	1,536	--	West Germany 1,232; France 284.
Ash and residue containing zinc	17,541	12,449	NA	West Germany 10,409; France 883; Cuba 490.
Metal including alloys:				
Scrap	9,805	6,398	5	West Germany 3,287; Belgium-Luxembourg 1,405; France 891.
Unwrought	25,521	19,710	25	West Germany 8,263; France 3,646; Belgium-Luxembourg 3,480.
Semimanufactures	4,890	4,760	1	West Germany 2,884; Belgium-Luxembourg 1,452; France 288.
Zirconium:				
Ore and concentrate	27,011	34,108	--	Australia 23,744; Republic of South Africa 6,500; Sri Lanka 3,364.
Metal including alloys:				
Scrap	NA	9	--	All from France.
Unwrought	NA	1	(1)	West Germany.[1]
Semimanufactures value	$39,233	$8,416	--	NA.
All forms	6	--		
Other:				
Ores and concentrates	28,247	21,501	16,442	Chile 3,207; Canada 1,043; Peru 307.
Oxides and hydroxides	r72,001	22,500	130	West Germany 11,426; Belgium-Luxembourg 10,400; France 366.
Ashes and residues	r49,518	62,378	NA	Canada 61,413; West Germany 740; Italy 129.
Pyrophoric alloys	70	148	--	United Kingdom 136; Austria 9.
Cermets value	$32,695	$35,268	--	Mainly from West Germany.
Base metals including alloys, all forms	r6	5	(1)	United Kingdom 2.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	449,876	306,051	162	West Germany 295,068; Turkey 9,940; Italy 309.
Artificial:				
Corundum	6,326	5,743	498	West Germany 3,368; France 987; Czechoslovakia 320.
Silicon carbide	1,239	813	211	West Germany 411; France 68; Norway 53.
Dust and powder of precious and semi-precious stones, including diamond kilograms	165	159	5	Belgium-Luxembourg 76; Ireland 44; Switzerland 24.
Grinding and polishing wheels and stones	2,752	2,346	73	West Germany 1,172; Austria 456; Italy 192.
Asbestos, crude	19,042	9,927	27	Canada 2,883; Republic of South Africa 2,517; U.S.S.R. 1,700.
Barite and witherite	81,728	98,928	--	China 43,952; Morocco 21,590; West Germany 16,528.
Boron materials:				
Crude natural borates	426,411	464,480	452,012	Belgium-Luxembourg 7,448; Turkey 4,800.
Oxides and acids	2,382	2,554	91	France 1,479; China 350; Belgium-Luxembourg 346.
Cement thousand tons	3,308	2,964	(1)	West Germany 1,478; Belgium-Luxembourg 1,465; France 17.
Chalk	64,605	65,979	40	France 35,267; West Germany 15,465; Belgium-Luxembourg 14,826.

See footnotes at end of table.

Table 3.—Netherlands: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	3,359	1,911	--	West Germany 1,161; Republic of South Africa 250; Belgium-Luxembourg 151.
Bentonite	64,756	60,382	28,446	Greece 16,816; Cyprus 5,340; West Germany 5,181.
Chamotte earth	29,005	25,020	1,443	West Germany 15,119; France 4,774; United Kingdom 2,468.
Dinas earth	1,706	1,093	--	West Germany 1,075.
Kaolin	469,562	403,112	48,059	United Kingdom 136,193; West Germany 123,874; Spain 33,113.
Unspecified	r681,048	723,818	12,718	West Germany 694,873; France 6,563; United Kingdom 4,504.
Products:				
Nonrefractory	310,098	231,472	17	West Germany 72,126; Belgium-Luxembourg 60,975; Italy 51,414.
Refractory including nonclay brick	56,724	55,495	246	West Germany 36,375; Austria 5,879; United Kingdom 5,683.
Cryolite and chiolite	221	35	--	France 25; Denmark 10.
Diamond:				
Gem, not set or strung ----- carats	366,938	440,278	21,532	United Kingdom 99,450; Zaire 81,718; Belgium-Luxembourg 72,950.
Industrial ----- do	589,247	493,030	48,619	United Kingdom 146,438; Belgium-Luxembourg 145,385; Ireland 109,044.
Diatomite and other infusorial earth	16,489	16,796	2,454	Denmark 11,661; France 1,144; West Germany 929.
Feldspar, fluorspar, related materials:				
Feldspar	21,632	14,860	--	Norway 10,255; Italy 2,384; West Germany 1,659.
Fluorspar	14,251	20,361	--	West Germany 5,037; France 873; unspecified 13,966.
Unspecified	32,820	41,123	--	Canada 22,265; Norway 18,803.
Fertilizer materials:				
Crude, n.e.s	87,068	82,227	--	West Germany 76,514; Belgium-Luxembourg 4,504; France 1,159.
Manufactured:				
Ammonia	156,988	202,626	--	United Kingdom 15,410; unspecified 186,479.
Nitrogenous	291,283	305,594	2,437	Belgium-Luxembourg 133,928; West Germany 65,916; United Kingdom 40,436.
Phosphatic	63,733	62,213	997	Belgium-Luxembourg 34,131; Tunisia 15,113; East Germany 6,336.
Potassic	389,800	381,894	--	West Germany 108,366; U.S.S.R. 67,751; East Germany 57,466.
Unspecified and mixed	136,763	108,193	11,925	West Germany 37,122; Belgium-Luxembourg 28,539; United Kingdom 17,378.
Graphite, natural	782	899	12	West Germany 451; China 268; United Kingdom 111.
Gypsum and plaster	425,223	461,404	69	West Germany 223,795; France 129,248; Belgium-Luxembourg 87,506.
Halogens:				
Bromine	3,766	3,192	126	Israel 2,927; United Kingdom 65; France 39.
Chlorine	83,298	67,498	1	West Germany 58,167; Belgium-Luxembourg 9,330.
Iodine	216	258	2	Belgium-Luxembourg 59; unspecified 191.
Lime	800,974	808,929	(1)	Belgium-Luxembourg 519,138; West Germany 289,051.
Magnesium compounds:				
Magnesite	r15,320	18,114	2	Greece 9,705; China 6,085; Italy 1,071.
Oxides and hydroxides	r793	827	19	West Germany 537; Japan 84; United Kingdom 81.
Other	55,239	39,672	207	China 12,545; Greece 9,029; Austria 4,718.
Mica:				
Crude including splittings and waste	1,999	3,915	274	India 1,623; Norway 681; Canada 513.
Worked including agglomerated splittings	26	25	2	Switzerland 11; Belgium-Luxembourg 5; West Germany 4.
Nitrates, crude	23,872	24,350	--	Chile 24,019; Belgium-Luxembourg 330.
Phosphates, crude ---- thousand tons	2,485	2,138	601	Morocco 858; Togo 429; Israel 224.

See footnotes at end of table.

Table 3.—Netherlands: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pigments, mineral:				
Natural, crude	799	530	--	Cyprus 302; West Germany 158; Italy 45.
Iron oxides and hydroxides, processed	14,239	13,180	75	West Germany 11,049; France 955; United Kingdom 384.
Potassium salts, crude	4,793	1,747	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material kilograms	61,802	42,844	21,505	West Germany 11,351; Republic of South Africa 1,708.
Quartz crystal, piezoelectric do	34	68	NA	NA.
Synthetic do	7,821	4,571	NA	West Germany 3,433; Japan 656; China 140.
Pyrite, unroasted	153	164	--	West Germany 163.
Salt and brine	71,173	66,710	34	West Germany 52,031; Belgium-Luxembourg 13,740; France 744.
Sodium and potassium compound, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	7,252	13,369	13	France 5,858; Belgium-Luxembourg 4,787; West Germany 1,949.
Sodium carbonate, natural and manufactured	63,276	45,323	2,461	West Germany 20,738; East Germany 10,578; Bulgaria 6,182.
Sodium hydroxide	234,615	430,734	1,330	West Germany 212,873; Belgium-Luxembourg 152,735; East Germany 56,584.
Sodium sulfate, natural and manufactured	22,986	20,819	--	Belgium-Luxembourg 15,008; West Germany 5,584; France 201.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	1,619	2,488	(1)	West Germany 1,504; Belgium-Luxembourg 605; Finland 311.
Worked	59,811	43,299	55	Italy 21,935; Belgium-Luxembourg 5,643; West Germany 5,573.
Dolomite, chiefly refractory-grade	923,051	784,055	68	Norway 24,798; United Kingdom 4,471; unspecified 748,091.
Gravel and crushed rock thousand tons	17,090	16,791	(1)	West Germany 11,229; Belgium-Luxembourg 3,631; United Kingdom 741.
Limestone other than dimension do	841	1,079	--	Belgium-Luxembourg 1,062; West Germany 10.
Quartz and quartzite	28,146	38,897	287	West Germany 15,716; Norway 14,018; Belgium-Luxembourg 7,829.
Sand other than metal-bearing thousand tons	7,593	6,415	1	West Germany 5,751; Belgium-Luxembourg 534; Norway 127.
Sulfur:				
Elemental:				
Crude including native and by-product	468,098	456,933	148,624	West Germany 149,050; Poland 81,888; France 76,860.
Colloidal, precipitated, sublimed	215	165	--	West Germany 88; United Kingdom 77.
Dioxide	3,541	5,530	--	West Germany 5,529.
Sulfuric acid	293,930	247,708	10	West Germany 229,063; Belgium-Luxembourg 7,632; Norway 5,527.
Talc, steatite, soapstone, pyrophyllite	32,827	37,771	1,591	Norway 13,158; Austria 7,368; France 3,614.
Vermiculite	7,113	8,722	--	Greece 3,011; Republic of South Africa 2,230; Mozambique 1,758.
Other:				
Crude thousand tons	r1,952	1,165	4	Belgium-Luxembourg 711; West Germany 398; Spain 4.
Slag and dross, not metal-bearing do	3,258	1,355	(1)	West Germany 655; Belgium-Luxembourg 630; France 67.
Oxides and hydroxides of barium, magnesium, strontium	864	450	4	West Germany 298; East Germany 80; United Kingdom 44.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	157,122	146,580	1,276	Belgium-Luxembourg 63,932; West Germany 44,016; France 8,984.

See footnotes at end of table.

Table 3.—Netherlands: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3,533	2,059	1,419	West Germany 347; Belgium-Luxembourg 160; Trinidad and Tobago 70.
Carbon:				
Carbon black	11,724	13,860	548	West Germany 12,126; Ireland 548; France 359.
Gas carbon value	$470	--		
Coal:				
Anthracite	417,808	419,242	25,833	United Kingdom 219,417; West Germany 105,789; Republic of South Africa 57,275.
Bituminous thousand tons	6,737	7,530	4,023	Australia 1,355; West Germany 1,083; Poland 445.
Briquets of anthracite and bituminous coal	5,582	4,095	--	West Germany 3,926; United Kingdom 143.
Lignite including briquets	194,101	166,612	--	West Germany 166,591.
Coke and semicoke thousand tons	857	1,011	20	West Germany 737; United Kingdom 208; Belgium-Luxembourg 17.
Gas, natural million cubic feet	133,448	116,415	--	West Germany 99,894; Norway 16,520.
Gas, manufactured	117,993	189,464	--	East Germany 51,958; West Germany 50,094; France 25,670.
Hydrogen, helium, rare gases million cubic feet	(3)	147	(1)	Belgium-Luxembourg 75; West Germany 66; United Kingdom 2.
Peat including briquets and litter	524,046	530,249	--	West Germany 512,429; Finland 11,170; U.S.S.R. 4,471.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	371,720	291,647	--	Saudi Arabia 123,410; Nigeria 37,335; United Kingdom 30,520.
Refinery products:				
Liquefied petroleum gas do	6,895	17,849	(1)	Saudi Arabia 8,813; United Kingdom 3,830; Belgium-Luxembourg 1,746.
Gasoline do	r58,644	46,147	27	U.S.S.R. 12,528; Belgium-Luxembourg 6,236; Algeria 4,590.
Mineral jelly and wax do	404	331	9	West Germany 100; Austria 84; France 57.
Kerosine and jet fuel do	r2,258	2,638	15	Belgium-Luxembourg 1,272; United Kingdom 234; Bahamas 178.
Distillate fuel oil do	r25,497	29,676	65	U.S.S.R. 21,255; Belgium-Luxembourg 4,369; United Kingdom 1,587.
Lubricants do	r2,398	2,375	95	Belgium-Luxembourg 582; United Kingdom 417; France 300.
Residual fuel oil do	36,212	41,879	281	Belgium-Luxembourg 10,016; United Kingdom 6,985; Trinidad and Tobago 3,289.
Bitumen and other residues do	1,663	2,422	702	Belgium-Luxembourg 1,409; West Germany 247; Netherlands Antilles 37.
Bituminous mixtures do	175	124	2	West Germany 94; Belgium-Luxembourg 19.
Petroleum coke do	2,985	3,160	1,988	West Germany 670; Netherlands Antilles 315; Norway 156.
Tars and other crude chemicals derived from coal, gas, and petroleum	761,003	779,201	44,014	West Germany 285,596; Sweden 107,904; Spain 87,328.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]Quantity in 1980 was 3,113 tons.

COMMODITY REVIEW

METALS

Aluminum.—The second largest aluminum company of the Netherlands, Aluminum Delfzijl NV, employing 700 workers, was threatened by the Government with a loss of its gas supply contract dating from 1963 that guarantees the company a supply of cheap gas until 1997. The guarantee was, in fact, the major reason for the establishment of the company, a subsidiary of Hoogovens Staal BV, and for its location at Delfzijl, near the gasfields. The Government ordered the company either to renegotiate the contract or to secure an alternative gas source by 1988.

Ferroalloys.—The Netherlands imported all ferroalloys used by its industry, mainly from Norway, France, and the Federal Republic of Germany. Most of the imports were as ferromanganese for use by the steel industry. Imports of ferrochromium from Albania jumped to almost 20,000 tons in 1981 compared with 9,500 tons in 1980.

Iron and Steel.—Two years after a merger of Dutch and West German steel companies, the Netherlands half of Estel-Hoogovens BV (Estel-Hoogovens BV between 1980 and 1982, and Hoogovens IJmuiden BV prior to 1980) broke with its West German partner, Hoesch AG, in 1982. The breakup reflected the general crisis in the European steel industry and possibly the inclusion of the Netherlands as a defendant in the U.S. producers' antidumping suit in 1981; company losses had been accumulating for the past 3 years. The new company, Hoogovens Staal, for the first time since 1980, negotiated independently for iron ore imports from the Peruvian iron ore supplier Minero Perú Comercial (Minpeco). The company negotiated a 15% price cut for pellet feed and for the 450,000 tons of ore contracted for the next year. Hoogovens Staal reportedly used 50% pellets in its blast furnaces, 40% sinter, and 10% lump ore. Its pelletizing plant at IJmuiden had an annual capacity of 3.5 million tons. The Netherlands does not have any direct-reduction plants.

MINERAL FUELS

The Netherlands, because of the fuel crisis in 1979, planned for an alternative fuel program, which in 1982 was still delayed and most likely may not be fully initiated until 1985, or even later.

The slump in domestic and foreign energy demand had an adverse effect on the Netherlands economy in 1982. Gas production was down 15%, the fourth year of declining output. The recently discovered oilfields and gasfields on the Continental Shelf were expected to be put into operation soon. Annual investments in oil- and gas-drilling equipment and related machinery were to reach more than $500 million. Two new North Sea pipelines were planned and were most likely to be constructed in 1983 and 1984 at an estimated cost of $1 billion.

Coal.—Domestic coal consumption rose to about 4.5 million tons, largely owing to increases in the generation of electricity by coal. In the past 2 years, two 600-megawatt coal-fired power stations had come onstream, and several others were under construction or conversion. The rise in coal consumption also necessitated increased imports of coal, mostly from the Federal Republic of Germany and Australia.

Natural Gas.—The Netherlands continued to be Western Europe's largest producer and exporter of natural gas. Gas production, which makes an important contribution to the GNP, fell by 15% because of low demand. Although the Netherlands benefited greatly from its natural gas discoveries, they represent only 1.8% of the world's total supplies and the reserves are expected to run out within the next 55 years. The Geological Survey of the Netherlands estimated the total gas reserves to be 75,700 billion cubic feet as of July 1, 1982. The Director of the Survey felt that the reserves would be insufficient to meet domestic needs in the event of a Soviet gas supply disruption, unless additional gas production and processing facilities were built.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Netherlands guilders (f.) to U.S. dollars at the rate of f.2.5=US$1.00, the average rate in 1982.

The Mineral Industry of New Zealand

By Charles L. Kimbell[1]

New Zealand's mineral industry remained only a modest contributor to the island nation's economy, despite some gains in output of both domestic crude mineral products and in the mineral processing sector, the latter based on both domestic resources and imported raw materials. The high points of mineral industry activities were the production gains registered by the natural gas-crude oil operations, coal mines, the single aluminum plant, and the single oil refinery, and inauguration of operations at the natural gas-based, ammonia-urea plant. The most significant negative developments were reduced output of iron sand (the nation's only mineral export of world significance) and gold and the announcement that construction of a second aluminum plant was postponed indefinitely.

The Government continued to display considerable interest in the nation's energy supply situation and in encouraging foreign investment in all areas of the economy, including the mineral industry.

PRODUCTION

Detailed information on activities of New Zealand's mineral industry during 1982 was not sufficiently complete to permit estimation of the value of crude domestic production for that year. However, the industry generally had a better year than did the mineral industry of many other market economy nations. The modest decline in output of iron sands for export, which reflected reduced steel industry production in Japan, the principal customer, was evidently more than offset, in terms of crude output value, by substantial gains in production of natural gas and crude oil and by more modest increases in output of coal and raw materials for cement. Output of gold, the nation's second most significant metallic mine product and the only other such commodity of economic significance, declined somewhat, and the lower levels of gold values combined to reduce its contribution to the nation's economy.

From the viewpoint of the nation's mineral processing industries, the aluminum industry, operating wholly on imported alumina, registered a significant gain in a year when the world trend was generally down. The domestic iron and steel industry and cement industry both showed modest upturns in output in response to domestic demand, and a new processing industry, based on domestic natural gas, an ammonia-urea plant, came into operation.

Table 1.—New Zealand: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal, smelter:					
Primary	151,100	154,100	154,740	153,979	[2]166,800
Secondary	1,500	1,500	2,000	3,000	[2]2,800
Total	152,600	155,600	156,740	156,979	[2]169,600
Copper concentrate:					
Gross weight	[3]	--	--	--	--
Copper content	[3]	--	--	--	--
Gold, mine output, metal content—troy ounces	[r]7,043	6,998	6,419	6,166	6,000
Iron and steel:					
Iron ore, gross weight[4]	170	127	72	197	200
Iron sand (titaniferous magnetite):					
Gross weight—thousand tons	3,946	3,527	3,638	3,253	3,050
Iron content—do	2,249	2,011	2,074	1,854	1,740
Pig iron (sponge iron)—do	28	27	[e]134	150	150
Crude steel—do	226	229	230	221	230
Lead, refinery output, secondary	8,000	9,000	7,000	7,000	7,000
Silver, mine output, metal content—troy ounces	[r]2,013	1,639	747	[e]800	800
Tungsten, mine output (scheelite):					
Gross weight	2	153	8	10	10
Tungsten content	[r]1	[r]85	4	5	5
Zinc concentrate:					
Gross weight	[3]	[3]	[3]	[3]	--
Zinc content	[3]	[3]	[3]	[3]	--
NONMETALS					
Cement, hydraulic—thousand tons	798	756	750	756	780
Clays:					
Bentonite	[r]9,824	4,954	3,000	1,885	2,000
Kaolin (pottery)	33,741	25,590	46,112	49,307	50,000
For brick and tile	118,734	110,021	130,719	132,226	130,000
Diatomite	[3]	[3]	[3]	[3]	--
Lime	[e]150,000	170,000	170,000	170,000	170,000
Magnesite	840	[3]	[3]	308	300
Nitrogen: N content of ammonia	--	--	--	--	60,000
Perlite	558	2,209	999	999	1,000
Pumice	39,468	25,781	13,463	33,834	32,000
Salt	65,000	55,000	5,500	55,500	55,000
Sand and gravel:					
Silica sand (glass sand)	127,998	136,657	139,899	129,146	130,000
Other industrial sand	71,800	83,400	115,700	363,446	300,000
For roads and ballast—thousand tons	15,272	13,189	13,559	16,439	15,000
For building aggregate—do	4,962	4,652	4,286	4,084	4,000
Stone:					
Dolomite	24,275	25,760	5,726	25,112	25,000
Greenstone	10	4	3	6	5
Limestone and marl:					
For agriculture—thousand tons	1,615	1,613	1,581	1,829	1,800
For cement—do	1,366	1,268	1,389	1,458	1,500
For other industrial uses—do	159	289	172	188	180
For roads—do	250	289	229	312	250
Serpentine	115,700	112,200	80,943	65,714	65,000
Unspecified:					
Dimension	26,600	27,158	16,350	30,791	25,000
Rock for harbor work—thousand tons	2,288	2,428	2,246	[e]2,500	2,200
Sulfur	[e]1,000	[e]650	[3]	90	100
MINERAL FUELS AND RELATED MATERIALS					
Carbon dioxide, liquefied	NA	NA	NA	6,066	NA
Coal:					
Bituminous—thousand tons	364	383	480	475	480
Subbituminous—do	1,669	1,355	1,473	1,510	1,520
Lignite—do	151	209	210	212	220
Total—do	2,184	1,947	2,163	2,197	2,220
Coke:					
Coke oven	28,000	30,000	30,000	4,004	4,000
Gashouse	[r]34,000	[r]35,000	36,000	20,953	20,000
Total	[r]62,000	[r]65,000	66,000	24,957	24,000
Fuel briquets	10,000	[e]15,000	[e]17,000	6,551	7,000

See footnotes at end of table.

Table 1.—New Zealand: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Gas, natural:					
Total gross production including associated CO_2 ——— million cubic feet	75,030	NA	NA	NA	NA
Fuel gas:					
Gross ——— do	55,215	[r e]53,700	[e]43,900	[e]62,700	109,900
Marketed ——— do	47,466	[r]46,172	37,753	53,890	[2]94,502
Natural gas liquids:					
Liquefied petroleum gas ——— thousand 42-gallon barrels	95	120	172	258	350
Natural gasoline ——— do	52	54	45	50	70
Petroleum and refinery products:					
Crude ——— do	[r]4,554	3,000	2,635	3,381	5,180
Refinery products:					
Gasoline ——— do	10,057	10,888	10,294	10,736	[2]9,801
Distillate fuel oil ——— do	4,692	4,864	4,879	5,058	[2]4,125
Residual fuel oil ——— do	5,668	5,854	5,235	3,623	[2]2,627
Other ——— do	600	1,106	973	630	[2]483
Refinery fuel and losses ——— do	695	490	665	910	[2]735
Total ——— do	21,712	[r]23,202	22,046	20,957	[2]17,771

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 21, 1983.
[2]Reported figure.
[3]Revised to zero.
[4]Not used for manufacture of iron; reportedly consumed for gas purification, preparation of stock licks, and manufacture of brick. Because of these uses, iron content is not reported.

TRADE

Complete detailed trade statistics for New Zealand for calendar year 1981, the latest year for which data were available, show that although the nation's total commodity trade was close to being in balance, there was a huge imbalance, proportionally, in terms of mineral commodities, as shown in the following tabulation, in million dollars:

	Value	
	1980	1981
Mineral commodities:		
Exports	$341.1	$338.2
Reexports	75.0	92.3
Total	416.1	430.5
Imports	1,903.7	1,780.1
All commodities:		
Exports	5,262.4	5,331.6
Reexports	191.3	236.4
Total	5,453.7	5,568.0
Imports	3,927.0	5,708.5

Mineral commodity imports accounted for 31.2% of total commodity imports in 1981, compared with 48.5% in 1980; in sharp contrast, mineral commodity exports and reexports represented only 7.7% of total commodity exports and reexports in 1981, compared with 7.6% in 1980.

Aluminum ingots continued to be the dominant single commodity among mineral commodity exports and reexports, accounting for nearly 42% of the total 1981 mineral commodity trade, a slight decline from its 1980 share of over 44%. Petroleum product exports ranked second, accounting for 33.3% of the 1981 total (27.1% in 1980), followed by all forms of iron and steel with 10% of the 1981 total (10.5% in 1980). Aluminum ingots were produced wholly from imported raw materials; the petroleum products and iron and steel were also largely produced from imported raw materials. The nation's iron sand exports ranked fourth, accounting for only 6.1% of the 1981 total, down slightly from the 6.8% level of 1980. Coal, the only other significant mineral commodity export of domestic origin, accounted for 2.6% of the 1981 total, a level about double the 1.3% recorded for 1980, but still only a small part of the total.

Refined petroleum was the dominant single mineral commodity group, accounting for 32.4% of total 1981 imports, down sub-

stantially from the 38.8% recorded for 1980; in contrast, second-ranked crude petroleum accounted for 30.0% of the 1981 total, substantially up from the 26.1% share in 1980. Other major mineral commodity imports were iron and steel (all forms) with 16.1% in 1981 (14.9% in 1980); alumina (the raw material basis for the aluminum export) with 4.3% in 1981 (3.3% in 1980); and mineral fertilizers with 3.2% in 1981 (2.7% in 1980).

Table 2.—New Zealand: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Rare-earth metals value, thousands	--	$2	NA	NA.
Aluminum: Metal including alloys:				
Scrap	2,506	2,480	--	Japan 2,048; Australia 384.
Unwrought	127,439	122,280	--	Japan 107,559; China 5,016; Hong Kong 4,021.
Semimanufactures	6,114	6,992	NA	Australia 1,543; Malaysia 1,118; Republic of Korea 1,011.
Chromium: Oxides and hydroxides	1	6	--	All to Fiji.
Copper: Metal including alloys:				
Scrap	1,365	1,594	--	Australia 1,429.
Unwrought	18	71	14	Australia 57.
Semimanufactures	2,152	2,713	800	Australia 731; Singapore 492; Malaysia 276.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite thousand tons	3,219	2,824	--	Japan 2,632; Republic of Korea 184.
Metal:				
Scrap	1,988	2,645	462	Japan 1,506; Hong Kong 219; Australia 149.
Pig iron, cast iron, related materials	--	2	--	Mainly to Kiribati.
Steel, primary forms	5,290	31,406	(1)	Indonesia 27,574; Fiji 3,797.
Semimanufactures:				
Bars, rods, angles, shapes, sections	46,478	14,348	--	Papua New Guinea 4,440; Fiji 2,537; China 2,521.
Universals, plates, sheets	28,019	39,091	9,338	Australia 9,310; Indonesia 7,013; Fiji 3,944.
Hoop and strip	270	116	--	Australia 57; Fiji 14; Singapore 9.
Rails and accessories	26	527	--	Papua New Guinea 515.
Wire	8,336	6,718	2,890	Australia 1,575; Hong Kong 539; Fiji 460.
Tubes, pipes, fittings	11,966	5,693	63	China 1,694; Papua New Guinea 1,363; Australia 1,318.
Castings and forgings, rough	216	297	--	Australia 280.
Lead:				
Oxides	--	4	--	All to Fiji.
Metal including alloys:				
Scrap	910	66,058	--	India 34,596; Hong Kong 13,845; Australia 627.
Unwrought	140	12	--	Australia 8; Cook Islands 3.
Semimanufactures	109	79	--	Fiji 33; Singapore 30.
Mercury value, thousands	--	$37	--	Australia $35.
Metalloids: Unspecified do	--	$2	--	All to Fiji.
Molybdenum: Metal including alloys, all forms do	$1	$5	--	All to Australia.
Nickel: Metal including alloys:				
Scrap	24	361	--	Australia 360.
Semimanufactures	6	6	--	Mainly to Cook Islands.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$44	$33	$2	Australia $30.
Silver:				
Waste and sweepings[2] do	$3,052	$683	$18	Australia $400; United Kingdom $222.
Metal including alloys, unwrought and partly wrought do	$1,167	$154	--	Australia $110; West Germany $26.
Tin: Metal including alloys:				
Scrap	--	26	--	Denmark 19; Australia 4; Japan 3.
Unwrought	1	1	--	All to United Kingdom.
Semimanufactures	14	(1)	--	NA.
Titanium: Oxides	--	1	--	All to Samoa.
Tungsten:				
Ore and concentrate	8	26	--	Singapore 18; Netherlands 8.
Metal including alloys, all forms value, thousands	$2	$5	--	Mainly to Australia.

See footnotes at end of table.

Table 2.—New Zealand: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Oxides	NA	16	--	Mainly to Australia.
Metal including alloys:				
Scrap	642	60,764	--	Australia 42,349.
Unwrought	93	74	--	Australia 54; Japan 20.
Semimanufactures	129	1	--	Mainly to Australia.
Other:				
Ashes and residues	1,030	692	--	United Kingdom 172; Australia 122; Japan 83.
Base metals including alloys, all forms value, thousands	$4	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	11	37	--	Fiji 30; Hong Kong 5.
Grinding and polishing wheels and stones value, thousands	$169	$99	--	Australia $33; Fiji $29; Papua New Guinea $20.
Barite and witherite	8	20	--	Australia 13; Fiji 6.
Boron materials: Oxides and acids	--	2	--	All to Fiji.
Cement	89,334	132,710	--	Papua New Guinea 46,555; French Polynesia 41,217; Samoa 11,450.
Chalk	136	88	--	Mainly to Fiji.
Clays and clay products:				
Crude, unspecified	4,609	6,520	--	Japan 4,484; Australia 332; Ireland 270.
Products:				
Nonrefractory value, thousands	$224	$314	$31	Fiji $71; Australia $54; Singapore $37.
Refractory including nonclay brick do	$376	$240	--	Singapore $125; Australia $47; Fiji $27.
Diamond:				
Gem, not set or strung do	$426	$174	$8	United Kingdom $65; Australia $60.
Industrial do	$2	$47	$1	Australia $35; Hong Kong $11.
Diatomite and other infusorial earth	34	21	--	Malaysia 14.
Fertilizer materials: Manufactured:				
Ammonia	5	6	--	Cook Islands 4.
Nitrogenous	123	2,334	--	Samoa 720; Cook Islands 449; Vanuatu 337.
Phosphatic	8,651	3,810	--	Norfolk Island 1,549; Tonga 1,425; Fiji 710.
Potassic	3,935	6,501	--	Fiji 2,630; Australia 2,599; Solomon Islands 95.
Unspecified and mixed	785	2,002	--	Norfolk Island 672; Niue 511; Fiji 186.
Graphite, natural	3	--		
Gypsum and plaster	129	802	--	American Samoa 326; Norfolk Island 265.
Halogens: Chlorine	7	2	--	Mainly to Samoa.
Lime	551	625	--	Papua New Guinea 291; Samoa 160; Fiji 154.
Mica: Crude including splittings and waste value, thousands	$2	$1	--	All to Australia.
Phosphates, crude	--	11	--	Mainly to Niue.
Pigments, mineral: Iron oxides and hydroxides, processed	15	6	--	All to Australia.
Potassium salts, crude	--	200	--	All to Fiji.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$65	$739	$268	Australia $239; Fiji $143.
Synthetic do	$100	$22	$2	Norfolk Island $7.
Salt and brine	3,482	2,652	--	Australia 1,935; Fiji 309; American Samoa 112.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	2	9	--	Samoa 5.
Sodium hydroxide value, thousands	$356	$379	--	Fiji $237; Hong Kong $117.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	44	48	--	Fiji 32; Australia 14.
Worked value, thousands	$82	$85	--	Cook Islands $27; Samoa $27.
Dolomite, chiefly refractory-grade do	$27	$4	--	Australia $3.
Gravel and crushed rock	1,063	1,087	66	Australia 534; American Samoa 481.
Limestone other than dimension	--	10	--	Samoa 5; Fiji 3.
Quartz and quartzite	2	(1)	--	All to Singapore.
Sand other than metal-bearing	305	430	--	Australia 229; Samoa 120; Fiji 41.

See footnotes at end of table.

Table 2.—New Zealand: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental: Crude including native and byproduct	--	10	--	All to Fiji.
Sulfuric acid	158	176	--	Papua New Guinea 76; Fiji 63.
Talc, steatite, soapstone, pyrophyllite	8	23	--	Fiji 20.
Other:				
Crude	1,335	1,818	--	Australia 1,760.
Slag and dross, not metal-bearing	--	29	--	India 16; Australia 13.
Oxides and hydroxides of barium, magnesium, strontium value, thousands	--	$2	--	Australia $1.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals do	$2,353	$2,135	$35	Papua New Guinea $875; Fiji $517; Philippines $354.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	115	410	--	Samoa 210; Tonga 152.
Carbon: Carbon black	2	210	--	Fiji 174; Australia 36.
Coal: Anthracite and bituminous	69,652	203,419	--	Japan 143,499; Republic of Korea 45,148; Fiji 14,771.
Coke and semicoke value, thousands	$1,084	$216	--	Mainly to Republic of Korea.
Gas, natural do	$3	$1	--	All to Fiji.
Peat including briquets and litter	1,759	70,389	--	Bahrain 17,041; Australia 15,585; Singapore 13,820.
Petroleum refinery products:				
Gasoline, motor 42-gallon barrels	298	1,122	--	Pacific Islands 748; Cook Islands 298.
Mineral jelly and wax do	582	299	--	Australia 236; Papua New Guinea 63.
Kerosine and jet fuel thousand 42-gallon barrels	2,166	3,216	--	NA.
Distillate fuel oil do	560	814	--	NA.
Lubricants value, thousands	$9,146	$2,062	$2	Fiji $668; Samoa $196.
Residual fuel oil thousand 42-gallon barrels	1,288	1,167	--	NA.
Bituminous mixtures do	9,035	6,042	67	Fiji 2,103; Barbados 1,454; Belgium-Luxembourg 1,315.
Tars and other crude chemicals derived from coal, gas, and petroleum	(3)	41	--	Papua New Guinea 18; Fiji 15; Australia 8.

NA Not available.
[1]Less than 1/2 unit.
[2]May include some platinum-group metals.
[3]Unreported quantity valued at $56,000.

Table 3.—New Zealand: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Rare-earth metals value, thousands	$20	$8	$2	Australia $3; United Kingdom $2.
Aluminum:				
Ore and concentrate	361	1,740	--	Guyana 1,490.
Oxides and hydroxides	(1)	302,944	1,044	Australia 297,657; Japan 3,210.
Metal including alloys:				
Scrap	55	63	(2)	French Polynesia 48.
Unwrought	272	3,639	2	Canada 3,003; United Kingdom 481; Australia 110.
Semimanufactures	3,548	3,143	414	Australia 1,570; Japan 468; Switzerland 189.
Beryllium: Metal including alloys, all forms value, thousands	$49	$1	--	All from West Germany.

See footnotes at end of table.

Table 3.—New Zealand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate	73	356	--	Republic of South Africa 338.
Oxides and hydroxides	145	122	3	West Germany 88.
Cobalt: Oxides and hydroxides	12	10	9	Belgium-Luxembourg 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$6	$2	--	Australia $1; United Kingdom $1.
Copper:				
Ore and concentrate do	$9	--		
Metal including alloys:				
Scrap	--	4	--	NA.
Unwrought	2,378	2,626	--	Australia 1,981; West Germany 628.
Semimanufactures[3]	10,288	11,710	47	Australia 10,809; United Kingdom 364.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	74	30	10	Australia 15.
Metal:				
Scrap	1,190	4,775	--	Fiji 1,922; French Polynesia 1,316; New Caledonia 850.
Pig iron, cast iron, related materials	1,579	1,219	53	Australia 490; United Kingdom 337; Japan 150.
Ferroalloys:				
Ferromanganese	935	883	--	Republic of South Africa 726; Australia 120.
Unspecified	3,189	2,420	101	Republic of South Africa 1,225; Australia 917.
Steel, primary forms	4,399	2,810	1	Australia 2,784.
Semimanufactures:				
Bars, rods, angles, shapes, sections	76,294	82,802	846	Japan 46,740; Australia 31,410.
Universals, plates, sheets	321,162	331,432	610	Japan 228,204; Australia 88,669; United Kingdom 7,762.
Hoop and strip	15,356	18,989	208	Japan 8,758; Australia 8,614; United Kingdom 677.
Rails and accessories	22,213	4,975	22	United Kingdom 3,124; Australia 1,502.
Wire	16,868	14,529	98	Japan 6,083; Australia 5,079; United Kingdom 2,156.
Tubes, pipes, fittings	19,304	24,151	795	Japan 15,030; Australia 4,626; West Germany 1,378.
Castings and forgings, rough	526	390	--	United Kingdom 332; Australia 58.
Lead:				
Oxides	117	187	14	Australia 129.
Metal including alloys:				
Scrap	36	--		
Unwrought	6,884	5,411	--	Australia 5,391.
Semimanufactures	13	165	1	Australia 157.
Magnesium: Metal including alloys:				
Unwrought value, thousands	$556	$519	$255	Norway $262.
Semimanufactures	6	15	3	Canada 6; United Kingdom 4.
Manganese:				
Ore and concentrate	440	341	--	Ghana 283; Australia 38.
Oxides	797	1,189	76	Australia 576; Japan 510.
Mercury value, thousands	$5	$16	$1	Australia $6; Spain $5.
Metalloids: Unspecified	510	423	19	Republic of South Africa 374.
Molybdenum: Metal including alloys, all forms value, thousands	$74	$28	$4	United Kingdom $24.
Nickel:				
Matte and speiss	26	1	--	Mainly from Australia.
Metal including alloys:				
Scrap	(4)	7	--	Australia 6.
Unwrought	16	131	--	All from Canada.
Semimanufactures	164	141	14	United Kingdom 53; Australia 25; West Germany 22.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$276	$233	$3	Australia $128; United Kingdom $54; Switzerland $20.
Silver:				
Waste and sweepings do	$579	$460	$3	Australia $453.
Metal including alloys, unwrought and partly wrought do	$7,975	$5,444	$88	Australia $5,101; United Kingdom $183.

See footnotes at end of table.

Table 3.—New Zealand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate value, thousands	--	$1	--	All from Australia.
Metal including alloys:				
Scrap	4	1	--	Do.
Unwrought	241	180	--	Australia 148; Malaysia 18.
Semimanufactures	20	34	(2)	Japan 16; Australia 14.
Titanium: Oxides	2,548	3,004	1,024	Australia 1,398; Japan 255; West Germany 202.
Tungsten: Metal including alloys, all forms value, thousands	$668	$721	$87	United Kingdom $542; Netherlands $54.
Zinc:				
Ore and concentrate	1	--		
Oxides	43	48	1	Canada 17; West Germany 15.
Metal including alloys:				
Scrap	104	91	--	Canada 89.
Unwrought	21,980	17,162	--	Australia 10,980; Canada 6,180.
Semimanufactures[5]	24	152	1	Canada 86; Australia 39.
Other:				
Ores and concentrates	777	70,179	--	Australia 67,410; United Kingdom 2,224.
Oxides and hydroxides	234	244	83	Norway 54; United Kingdom 41; Japan 34.
Base metals including alloys, all forms value, thousands	$472	$870	$49	Japan $465; Australia $110; China $72.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	168	210	154	France 25; United Kingdom 14.
Artificial: Corundum	48	54	50	United Kingdom 3.
Dust and powder of precious and semiprecious stones, excluding diamond value, thousands	$113	$144	$122	Ireland $10; United Kingdom $7.
Grinding and polishing wheels and stones do	$1,893	$1,904	$380	United Kingdom $410; Australia $405; Japan $220.
Asbestos, crude	5,558	5,003	(2)	Canada 4,392.
Barite and witherite	3,598	2,476	--	Australia 1,502; China 710.
Boron materials:				
Crude natural borates value, thousands	$76	$53	$37	China $14.
Oxides and acids	402	571	570	United Kingdom 1.
Cement	3,348	3,531	108	Japan 1,167; Denmark 576; United Kingdom 545.
Chalk	408	778	(2)	United Kingdom 432; France 339.
Clays and clay products:				
Crude, unspecified	7,150	7,790	3,477	Australia 2,502; United Kingdom 1,370.
Products:				
Nonrefractory value, thousands	$1,462	$1,898	$7	Japan $818; United Kingdom $602; Thailand $165.
Refractory including nonclay brick[6]	3,612	7,055	101	United Kingdom 3,670; Republic of South Africa 1,772.
Cryolite and chiolite	1	30	--	Denmark 29.
Diamond:				
Gem, not set or strung value, thousands	$2,205	$2,704	$37	India $1,614; Belgium-Luxembourg $457.
Industrial do	$64	$183	$43	Australia $100.

See footnotes at end of table.

Table 3.—New Zealand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diatomite and other infusorial earth	995	1,152	670	Japan 455.
Feldspar, fluorspar, related materials	870	1,166	43	Canada 531; Norway 380.
Fertilizer materials: Manufactured:				
Ammonia	695	668	1	Australia 666.
Nitrogenous value, thousands	$16,731	$19,584	$5,087	Japan $7,333; Australia $5,565; Republic of Korea $496.
Phosphatic	12,242	21,853	7,643	Israel 13,794; United Kingdom 366.
Potassic	205,207	138,386	95,390	Canada 32,221; U.S.S.R. 6,725; Israel 3,440.
Unspecified and mixed value, thousands	$10,446	$13,211	$9,301	West Germany $1,727; Belgium-Luxembourg $1,316; United Kingdom $544.
Graphite, natural	222	72	1	United Kingdom 39.
Gypsum and plaster	99,271	119,954	25	Australia 119,491.
Halogens:				
Chlorine	1,024	539	(2)	Mainly from Australia.
Unspecified	11	29	14	Australia 7; Japan 5.
Lime	10	9	--	All from United Kingdom.
Magnesium compounds: Magnesite	5,871	2,158	115	Australia 1,622; China 375.
Mica:				
Crude including splittings and waste value, thousands	$107	$157	$1	Republic of South Africa $57; India $33.
Worked including agglomerated splittings do.	$218	$175	$2	United Kingdom $100; Australia $29.
Nitrates, crude	--	36	18	West Germany 18.
Phosphates, crude	1,220,035	885,205	43,597	Christmas Island 490,458; Nauru 315,481.
Pigments, mineral: Iron oxides and hydroxides, processed	1,041	1,764	23	West Germany 1,429; Australia 191.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1,692	$1,661	$25	Thailand $783; Australia $244; West Germany $153.
Synthetic do.	$64	$123	$9	West Germany $56.
Salt and brine	97,256	65,104	4	Netherlands Antilles 64,805.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	527	1,165	16	Canada 700; United Kingdom 229; West Germany 106.
Sodium carbonate, natural and manufactured	38,583	27,079	23,737	United Kingdom 2,195; Australia 312; Japan 301.
Sodium hydroxide value, thousands	$9,511	$8,440	$942	United Kingdom $5,604; Australia $1,665.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,181	1,797	8	Republic of South Africa 973; Italy 508; China 169.
Worked value, thousands	$265	$290	$5	Italy $218.
Dolomite, chiefly refractory-grade	2	24	--	West Germany 18; United Kingdom 6.
Gravel and crushed rock	101	90	--	France 41; United Kingdom 30; Italy 18.
Quartz and quartzite	43	332	7	Australia 290.
Sand other than metal-bearing	489	550	23	Australia 505.
Sulfur:				
Elemental:				
Crude including native and byproduct	279,213	204,110	50,997	Canada 153,037.
Colloidal, precipitated, sublimed	267	220	11	Australia 209.
Sulfuric acid	33	9	2	United Kingdom 6.
Talc, steatite, soapstone, pyrophyllite	2,753	3,026	40	Australia 2,770; China 187.

See footnotes at end of table.

Table 3.—New Zealand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Other:				
Crude value, thousands	$324	$269	$7	Australia $101; United Kingdom $55; Australia $36.
Slag and dross, not metal-bearing	63	148	--	Australia 144.
Oxides and hydroxides of barium, magnesium, strontium	1,845	763	53	Australia 627; West Germany 59.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value, thousands	$320	$315	$123	United Kingdom $138; Australia $54.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	52	54	10	Trinidad and Tobago 36.
Carbon: Carbon black	7,489	7,509	131	Australia 7,017.
Coal:				
Anthracite and bituminous	356	371	--	Australia 339.
Briquets of anthracite and bituminous coal	1,017	1,511	1,511	
Lignite including briquets	--	6	6	
Coke and semicoke value, thousands	$418	$467	$40	Australia $427.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	11,595	14,032	(2)	Saudi Arabia 6,745; Indonesia 4,789; Qatar 1,901.
Refinery products:				
Liquefied petroleum gas value, thousands	$252	$165	$34	France $66; Australia $41.
Gasoline, motor thousand 42-gallon barrels	4,222	1,423	77	Australia 660; Bahrain 385; Singapore 294.
Mineral jelly and wax value, thousands	$3,219	$2,484	$414	Japan $940; China $175; West Germany $148.
Kerosine and jet fuel thousand 42-gallon barrels	2,668	1,498	4	Singapore 822; Australia 669.
Distillate fuel oil do.	3,591	1,827	23	Singapore 1,073; Australia 475; Bahrain 234.
Lubricants value, thousands	$32,190	$26,757	$2,511	Australia $15,062; Singapore $5,391.
Residual fuel oil do.	$211,634	$154,682	--	Singapore $95,061; Kuwait $26,226; Bahrain $15,286.
Bitumen and other residues thousand 42-gallon barrels	(2)	(2)	(2)	(2)
Bituminous mixtures do.	3	2	--	Mainly from France.
Petroleum coke do.	377	568	568	
Tars and other crude chemicals derived from coal, gas, and petroleum[7]	18,318	17,627	--	Australia 17,589.

NA Not available.
[1]Unreported quantity valued at $63,741,000.
[2]Less than 1/2 unit.
[3]Excludes unreported quantities valued at $2,453,000 in 1980 and $2,507,000 in 1981.
[4]Unreported quantity valued at $4,000.
[5]Excludes unreported quantities valued at $820,000 in 1980 and $1,053,000 in 1981.
[6]Excludes unreported quantities valued at $8,289,000 in 1980 and $7,101,000 in 1981.
[7]Excludes unreported quantities valued at $3,891,000 in 1980 and $3,208,000 in 1981.

COMMODITY REVIEW

METALS

Aluminum.—The Tiwai Point plant of New Zealand Aluminium Smelters Ltd., near Bluff at the southern end of South Island, remained the nation's only operating aluminum smelter through 1982. The addition of a third potline was completed during the year, raising the facility's annual capacity to about 245,000 metric tons. This addition presumably accounted for the 1982 recorded increase in aluminum output, one of the few increases recorded among all world producers.

Although the New Zealand Government approved construction of a second smelter in 1981, establishment of this facility reportedly was deferred by the company for an indefinite time in October 1982 owing to world market conditions. The first 100,000-

ton-per-year-capacity potline of this facility was originally projected to come onstream in 1984 by CSR Ltd., the firm designated to build the facility, but the deferral in construction startup made completion by that time impossible.

Gold.—Relatively high gold prices and prospects of even higher prices in the future provided continued stimulation to gold mining activities in New Zealand, despite the fact that the country's principal existing operation, that of Kanieri Gold Dredging Ltd.'s dredge on the Tara Makau River, South Island, operated on one of the lowest grade alluvial deposits undergoing commercial exploitation in the world. Although actual 1982 output was unavailable, a continued decline was expected. Although other New Zealand gold properties continued to receive some attention as a result of world gold markets, none of these were assessed as potentially significant even by the modest standards of the island nation's small industry.

Iron Sands.—In terms of value, New Zealand's titaniferous magnetite sands remained the foremost crude nonfuel mineral despite a decline in output resulting from reduced demand by the principal export customer, Japan. Through 1982, three deposits, all along the western coast of North Island, were undergoing exploitation. These were the Waverley deposits of Waipipi Ironsands Ltd. and the Taharoa and north Waikato deposits of New Zealand Steel Mining Ltd. Waipipi Ironsands operated solely to meet export demand; New Zealand Steel Mining provided both for exports and for its own direct-reduction steel plant at Glenbrook.

Steel.—The Glenbrook plant of New Zealand Steel Ltd. remained the only plant in the country using iron ore as its raw material base through 1982. This plant, best described as semi-integrated, at the end of 1981 had facilities for the production of pipe, rectangular hollow sections, galvanized products, and billets (including quantities of the latter in excess of its own needs), and, during early 1982, commissioned facilities for production, prepainting and laminating flat steel products. The company's efforts toward plant expansion were expected to provide an annual ingot output capacity of 750,000 tons by project completion.

The nation's second steel plant, that of Pacific Steel Ltd., commenced operations in 1962 utilizing scrap collected by an affiliate, Pacific Scrap Ltd. By 1982, the plant was using collected scrap, as well as billets purchased from New Zealand Steel, to produce wire rod, reinforcing bars, flat bars, angles, and channels.

NONMETALS

Nitrogen.—Construction of an ammonia-urea plant, owned by Petrochem N. Z. Ltd., a Petroleum Corp. of New Zealand Ltd. subsidiary, was completed. The facility, with an annual capacity of 155,000 tons, was expected to provide most of its output to the export market at the outset of operations.

MINERAL FUELS

Coal.—Despite relatively abundant reserves that led to a 1979 decision to develop a coal export program, output of this energy commodity has remained virtually unchanged over the past 5 years, averaging about 2.14 million tons annually. Coal deposits, distributed over both islands, were exploited in 1982 by some 70 individual mines, with about 70% of total output in the recent past being obtained from opencast mines.

Total recoverable coal reserves in all categories are 3.9 billion tons, including lignite reserves rated 50% recoverable. The distribution of these reserves by grade was incorrectly reported in the 1981 chapter; correct quantities are bituminous coal, 0.2 billion tons; subbituminous, 0.8 billion tons; and lignite, 2.9 billion tons. Of the total reserve, almost 0.7 billion tons, all subbituminous, is in the coalfields of North Island; the remainder, including all bituminous, all lignite, and 0.1 billion tons of subbituminous, is in South Island coalfields.

Natural Gas.—Reported natural gas output for the first 9 months of 1982 suggested that production for the full year would more than double that of 1981. A portion of growth was undoubtedly used in the new ammonia-urea plant that came onstream. Projects were still underway to link New Zealand's two natural gasfields, Kapuni and Maui, with domestic consumption centers. The completion of these pipeline systems will permit full utilization of the developed production potential of these fields.

Petroleum.—Reported production data for crude oil for the first 9 months of 1982 indicate an annual production level over 50% higher than that of 1981. The increase was the result of higher output of natural gas from Kapuni and Maui Gasfields, where the oil is obtained in effect as a byproduct.

The growth in crude oil production raised output to a level slightly under 20% of

national refinery throughput and slightly under 10% of national refinery product demand. Thus, although there was a substantial increase in output, it still fell far short of providing domestic oil self-sufficiency.

Efforts continued to reduce this shortfall. The Petroleum Corp. of New Zealand reported a test of its McKee well in North Taranaki on North Island that yielded 1,000 barrels per day of a thick waxy crude oil and an undisclosed quantity of gas from a depth of 2,300 meters. The company also drilled its No. 1 Ohaero wildcat in North Taranaki to a depth of 3,700 meters, with unreported results. Similarly, results of N. Z. Petroleum Co. Ltd.'s activities on its lease off the coast of South Island near Greymount were unreported. The firm, which held a 5-year lease on the tract that had been issued in 1980-81, planned to drill to a 2,100-meter target depth.

Results of another exploratory drilling project, that of Shell-BP-Todd Oil Services off the coast of Taranaki, North Island, using the Sedco 445 drillship, were also unreported at yearend.

Expansion of the country's single oil refinery, the Marsden Point facility near Whangarei, continued in 1982, with completion of the present expansion project slated for 1984. The announced goal of this project was a 700,000-barrel-per-day crude throughput capacity.

A second petroleum product facility was due to be completed in 1985. This facility, the world's first commercial-scale natural gas-to-gasoline plant, would improve New Zealand's self-sufficiency situation only with regard to gasoline, but this in itself would be a significant contribution to improving the country's foreign trade balance.

[1]Senior foreign mineral specialist, Division of Foreign Data.

The Mineral Industry of Nigeria

By Ben A. Kornhauser[1]

Nigeria's economic activity depended primarily on petroleum, which accounted for over 90% of export earnings, 75% of Government revenue, and 25% of gross domestic product (GDP). In fiscal year 1982, the balance of payments changed from a surplus to a $5 billion deficit.[2] Foreign reserves fell from $1.75 billion at yearend 1981 to about $750 million at yearend 1982, a 57% drop. The Federal revenue shortfall also caused Nigeria to draw almost all of its unconditional borrowing rights in the International Monetary Fund. The Government budget also was decreased by 20% to $6.12 billion through large expenditure cuts and stricter control of imports and foreign exchange. Controls included compulsory advance deposits on imports of 25% for spare parts and raw materials, increased customs and excise duties, and placing certain items under specific import license. The GDP decreased 2% from that of 1981 to $20.3 billion. Reduced revenues caused the Government to cut back on projects, obligations, and commitments.

The National Electric Power Authority was building two hydroelectric stations at Shiroro (600 megawatts) and Jebba (540 megawatts). The Kainji power station (760 megawatts) had been in service for over 10 years.

PRODUCTION AND TRADE

The Organization of Petroleum Exporting Countries (OPEC) reduced the crude oil production quotas for its members in order to match world demand. Nigeria's maximum production was set at 1.3 million barrels per day compared with a potential production of 2.1 million barrels per day. This allocation enabled Nigeria largely to maintain its established OPEC crude oil price. In 1982, Nigerian crude oil production was 7% of OPEC's and 2% of world crude oil production.

Nigerian-U.S. trade dropped during 1982 owing to the world oil glut and the resulting decreased revenues and their restrictions on imports. U.S. purchases from Nigeria, mostly oil, fell $2 billion to $7 billion while Nigerian imports fell to $1.25 billion, 15% less than 1981 levels. The country had a $6 billion deficit in short-term trade, a $2 billion per year long-term debt service, and an annual $1.5 billion imported food bill. Accordingly, oil revenues must be in the $8 to $10 billion range to permit the development of new projects and maintenance of necessary equipment.[3] Nigeria was the United Kingdom's largest trading partner in Africa and its largest market outside of the United States and Western Europe.

In 1982, Nigeria produced 1% of the world's tin production and was the eighth largest tin producer in the world. Production was only 72% of that of 1981. The columbite-tantalite production was reduced by 48%, in step with the decreased tin production with which it was associated. The importance of Nigerian columbite as a source of columbium continued to decline with the increased availability of the oxide from pyrochlores.

Table 1.—Nigeria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Columbium and tantalum concentrates, gross weight:					
Columbite	666	567	554	377	180
Tantalite	1	1	1	2	1
Iron and steel: Steel, crude	15,000	15,000	15,000	15,000	100,000
Lead:					
Mine output, metal content[e]	50	70	[r]366	204	260
Metal, refined, secondary	--	1,500	2,000	2,000	2,000
Tin:					
Mine output, cassiterite concentrate:					
Gross weight	4,011	3,824	3,543	2,383	1,708
Sn content	2,935	2,750	[r]2,569	17,300	1,240
Metal, smelter	2,984	2,858	2,678	1,800	1,290
Zinc ore and concentrate, metal content	--	--	--	[e]100	100
NONMETALS					
Cement, hydraulic thousand tons	1,536	1,740	2,000	2,500	2,500
Clays:					
Kaolin	650	670	671	635	700
Unspecified	NA	NA	56,973	39,835	20,900
Feldspar[e]	5,000	5,000	5,000	5,000	5,000
Stone:					
Limestone thousand tons	[e]1,200	2,006	2,336	1,509	920
Marble	[e]6,000	1,031	368	3,735	3,300
Shale thousand tons	NA	149	158	140	140
MINERAL FUELS AND RELATED MATERIALS					
Coal do	264	172	[r]176	116	NA
Gas, natural:					
Gross million cubic feet	721,405	[e]820,000	[e]750,000	700,000	685,000
Marketed do	13,420	[e]18,100	[e]19,000	19,000	19,000
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	[r]692,000	[r]840,000	[r]753,000	525,000	472,000
Refinery products:					
Gasoline do	17,749	8,395	[e]10,600		
Jet fuel do	6,784	160	[e]200		
Kerosine do	--	4,585	[e]5,800		
Distillate fuel oil do	12,817	8,760	[e]11,000	NA	NA
Residual fuel oil do	8,427	10,220	[e]12,800		
Other, unspecified do	9,220	730	[e]900		
Refinery fuel and losses do	1,650	1,460	[e]1,800		
Total do	56,647	34,310	[e]43,100	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through July 19, 1983.

COMMODITY REVIEW

METALS

Columbium and Tantalum.—The Amalgamated Tin Mines of Nigeria (Holdings) Ltd. and Bisichi-Jantar Nigeria Ltd. accounted for all production of columbium and tantalum in 1982 in relatively equal amounts.

Iron Ore.—Iron ore was discovered on the Agbaja Plateau northeast of Lagos. The reserves, which had not been fully tested, were estimated at 2 billion tons.[4] However, the Itakpe iron ore mine, which contained an estimated 200 million tons of proven reserves of Itabirite ore grading 36% iron, was being prepared to eventually supply all of the iron ore requirements of the Ajaokuta steel complex and one-third of the requirements of the Delta steel complex.

Iron and Steel.—The Government-owned Katsina Steel Rolling Co. started operations. The steel wire, rod, and bar rolling mill had the capacity to produce 170,000 tons of wire and 40,000 tons of reinforcing bar per year and was built by Japan's Kobe Steel Ltd. in northern Nigeria at a cost of about $125 million. The steel was produced from billets shipped from the Delta Steel Co. and produced by the direct-reduction process.[5] The two Midrex direct-reduction plants were started up in 1982. Because of the remoteness of Delta Steel at Warri, oxygen- and nitrogen-producing facilities were installed at the plantsite. Iron ore for the plant was imported from the Liberian Nimba Mine of Lamco Joint Venture. The

limestone came from the Cross River Limestone Co., a national company at Mafamosing near Calabar in the State of Cross River.[6]

Tin.—Nigeria joined in forming the Association of Tin Producing Countries that included Australia, Bolivia, Indonesia, Malaysia, Thailand, and Zaire. During the year, the tin production from the gravel pump and contract tin mining operations at Gùrum, Rafin Jaki, and Banke was 191 tons, about double that of 1981.

NONMETALS

Cement.—The Naira cement plant of northern Nigeria in Sokoto began production after 15 years of inactivity. The factory was expected to be in full operation in 1984. The Benue Cement Co. was unable to meet demands of up to 3,000 tons per day owing to a weak capital base and an inadequate supply of water and electricity. Nigeria has been importing about twice as much cement as it produced.

MINERAL FUELS

Coal.—Coal production at the Nigerian Coal Corp. from the Enugu and Akaba Mines had fallen to less than 3,000 tons per month compared with nearly 9,600 tons per month in 1981. The drop in production resulted from poor equipment, lack of spare parts, and lack of support services and training programs for engineers. There were 270 million tons of proven reserves of subbituminous coal and lignite. The largest reserves were believed to be in Benue State with the main coal body in the Anambra River Basin. Nigeria planned domestic coal production to reach 2.5 million tons of coal by 1985 to be consumed by coal-fired power stations, the Ajaokuta steel mills, and cement plants.[7] Nigeria and Great Britain signed a Memorandum of Understanding to increase the output of the Oji River coal-fired powerplant from 30 to 120 megawatts and to develop the Enugu coal mines.

Natural Gas.—Consumption of gas was expected to rise by 70 million cubic feet per day following the startup of the direct-reduction steelmaking plant at Aladja. The blast furnace-steel complex at Ajaokuta, when finished, would consume 200 million cubic feet per day of gas.[8] The Bonny LNG Ltd. was dissolved in 1982 because Phillips Petroleum Worldwide Gas Ltd. and BP Africa Gas Co. withdrew. The remaining partners, Shell Nederland BV, Azienda Generali Italiana Petroli S.p.A., Elf-Aquitaine du Gaz, and The Nigerian National Petroleum Corp. (NNPC), were attempting to develop an alternative with more limited objectives and different assumptions. Bechtel Petroleum Inc., on its own initiative, studied the feasibility for a 4,000-kilometer pipeline to flow Nigerian gas over the Sahara Desert and under the Mediterranean Sea to Europe. Bechtel informed Nigeria that the pipeline was feasible and would cost $9 billion, $5 billion less than the Bonny project. The proposed 42-inch pipeline could carry 1.5 billion cubic feet per day, close to that of the original Bonny project. Nigeria has been flaring about 1 billion cubic feet per day. Cost estimates for the project did not include distributing the gas in Europe.[9]

From its Ibewa-3 well in the OML 58 onshore permit northwest of Port Harcourt, Elf-Aquitaine tested 18.2 to 21.9 million cubic feet per day with 2,422 to 3,082 barrels per day of condensate from three zones. However, Elf-Aquitaine did not expect to exploit the gasfield unless a liquefied natural gas export plant would come onstream. The possibility of extracting only the condensate and reinjecting the gas was under consideration.[10]

Petroleum.—Nigeria's crude oil production in 1982 was 472 million barrels, 90% of 1981 production. This decline resulted from OPEC's assigned production quotas. Ashland Oil Inc., operating under Nigeria's only production-sharing contract, was completing a six-well development program to increase its onshore output to 15,000 to 20,000 barrels per day by yearend. Izombe, the company's only well, produced 11,928 barrels per day in December. Ashland had three offshore prospects—Alan-1 (4,258 barrels per day), Ebughu-1 (1,163 barrels per day), and Adanga-1 (1,023 barrels per day). In the second half of 1982, Ashland expected to acquire a drilling rig for its offshore development work.[11]

Elf-Nigeria Ltd.'s small Otuo Field on OML 59 was discovered with the Otuo-3 well, which tested 3,938 barrels per day of light oil from a depth of 8,570 to 8,695 feet. Field development would depend on an increase in the official profit margin although the field was located near existing offshore facilities to which it could be connected.[12]

The Exploration and Exploitation Div. of NNPC discovered six petroleum deposits in the northeastern part of Borno State. Texaco Inc. found oil 9 miles offshore Nigeria with its Sengana-3 well that flowed 4,290 barrels per day of high-quality oil from

three zones below 11,800 feet. Tests of two other zones below 12,600 feet flowed 700 to 950 barrels per day of high-quality crude oil. The test confirmed the presence of a 390-foot-thick oil-bearing sand between 11,824 and 12,968 feet. The discovery well was 3 miles from the Funiwa platform and was owned 60% by NNPC, 20% by the Standard Oil Co. of California, and 20% by Texaco, the operator.[13]

Mobil Oil Nigeria Ltd. had drilled six wells at its Edop Field, 40 kilometers off Qua Ibol, which confirmed Edop as a major discovery. The reserves were estimated at 1 billion barrels. Gulf made a discovery with its Inda-1X well, which was drilled 3 miles off the Bonny Estuary.[14]

As a result of the Nigerian Port Authority's holdup in routing an oil pipeline through the Calabar Port to the NNPC Calabar fuel depot, the depot has been idle since its completion 2 years ago. The fuel depots at Gusau in Sokoto State and Gombe in Bauchi State also had been idle for about 2 years since the commissioning of the Kaduna heavy crude oil refining unit. The lack of facilities for receiving imported heavy crude oil for the second distillation unit prevented the production of fuel to supply these depots.[15]

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[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Nigerian naira (N) to U.S. dollars at the rate of N1.00=US$1.45.
[3]Business America. Mar. 21, 1983, pp. 29-31.
[4]London Financial Times. May 12, 1982, p. 27.
[5]American Metal Market. V. 90, No. 243, Dec. 16, 1982, p. 2.
[6]Skillings' Mining Review. V. 72, No. 2, Jan. 8, 1983, pp. 21, 24.
[7]Lagos News Agency of Nigeria. 0852 GMT, Nov. 11, 1980.
[8]Petroleum Economist. V. 49, No. 3, March 1982; p. 112.
[9]———. V. 49, No. 6, June 1982, p. 256.
Oil and Gas Journal. V. 80, No. 20, May 17, 1982, p. 46.
[10]Petroleum Economist. V. 50, No. 1, January 1983, p. 29.
[11]Work cited in footnote 8.
[12]Work cited in footnote 9.
[13]Work cited in footnote 10.
[14]Petroleum Economist. V. 49, No. 5, May 1982, p. 205.
[15]Oil and Gas Journal. V. 80, No. 20, May 17, 1982, p. 48.

The Mineral Industry of Norway

By Joseph B. Huvos[1]

The Norwegian economy stagnated in 1982. For the first time since 1958, the gross national product (GNP) showed no growth at constant prices compared with that of 1981 and was about $65 billion at current prices.[2] Unemployment rose to 2.5% owing to a 2.6% decline in industrial production, and the consumer price index rose 11.3%. Although the contribution of the petroleum sector to the GNP increased, that of the rest of the mineral sector, consisting of hydropower-based aluminum, magnesium, ferroalloys, copper, zinc, and industrial minerals, decreased.

Important events in the mineral and related industries included commissioning of Amoco Minerals Co.'s Valhall Oilfield, completion of the expansion of one of Norsk Hydro AS's aluminum smelters and continued construction on the expansion of its magnesium smelter, and ongoing merger talks in the ferroalloy and steelmaking industries. Elkem AS's Rødsand vanadium-titanium-iron ore mine was closed, as was its Beremanger pig iron plant, and preparations were made for closing down its Sulitjelma copper mine in 1983.

PRODUCTION

There was no significant change in the pattern of production of Norway's mineral industry in 1982.

Table 1.—Production indexes, metal and mineral industry

(1975=100)

	1981	1982[p]
Oil, mining, energy	132	131
Oil and mining	375	381
Coal	52	56
Crude oil and natural gas	450	458
Ore mining	98	83
Oil refining	66	65
Ceramics and glass	107	107
Mineral products	86	83
Iron, steel, ferroalloys	72	65
Nonferrous metals	101	93

[p]Preliminary.

Source: Monthly Bulletin of Statistics of Norway. V. 101, No. 3, 1983, pp. 16-19.

Table 2.—Norway: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum metal:					
Primary ingot	638,559	663,916	653,337	632,783	636,934
Secondary ingot	[r]4,000	3,500	4,500	4,000	4,000
Superpure	4,700	NA	NA	NA	NA
Cadmium metal, smelter	120	115	130	117	104
Cobalt metal	522	953	1,275	1,444	992
Copper:					
Mine output, metal content of concentrate	29,073	28,016	28,869	28,238	27,942
Metal:					
Smelter, primary only	[r]26,061	27,339	33,690	31,952	24,388
Refined:					
Primary	15,674	20,964	25,785	26,077	18,041
Secondary	5,578	6,000	[e]6,000	[e]6,000	[e]6,000
Total	21,252	26,964	31,785	32,077	[e]24,041
Iron and steel:					
Iron ore and concentrate thousand tons	3,773	4,066	3,884	4,064	3,266
Metal content of ore do.	2,452	2,643	2,473	2,684	2,123
Roasted pyrites do.	158	[e]110	[r]150	[e]150	[e]150
Pig iron do.	554	650	612	568	483
Ferroalloys:					
Ferrochrome do.	15	12	11	12	10
Ferrochromium silicon do.	1	1	(2)	1	[e]1
Ferromanganese do.	273	338	287	225	186
Ferrosilicon (75% basis) do.	266	349	307	274	260
Silicon metal do.	58	[e]70	85	[e]50	56
Ferrosilicomanganese do.	134	184	163	198	198
Other do.	30	29	7	12	11
Total do.	777	983	860	772	722
Steel, crude do.	812	923	854	848	768
Semimanufactures:					
Rolled do.	644	741	[e]750	[e]740	[e]740
Finished castings do.	4	6	[e]10	[e]6	[e]6
Lead:					
Mine output, metal content	3,561	3,596	2,600	3,600	3,700
Smelter, secondary only	917	400	[e]400	--	--
Magnesium metal, primary	39,160	44,177	44,352	47,602	35,000
Nickel:					
Concentrate, metal content	536	[e]500	[e]500	[e]500	500
Metal, primary	23,739	30,686	37,123	37,095	25,644
Platinum-group metals[3] troy ounces	33,630	37,327	NA	NA	NA
Titanium: Ilmenite concentrate	766,990	819,815	827,814	657,625	551,764
Vanadium, mine output, metal content[e]	460	570	540	570	300
Zinc:					
Mine output, metal content	29,592	29,592	28,670	29,800	31,900
Metal, primary	71,628	77,763	79,416	80,279	78,734
NONMETALS					
Cement, hydraulic thousand tons	2,232	2,197	2,093	1,789	1,705
Feldspar, lump[4]	59,522	87,888	67,559	[e]70,000	[e]70,000
Graphite	11,151	11,892	10,406	8,665	7,451
Lime, hydrated, and quicklime	126,364	[e]130,000	130,000	[e]130,000	[e]130,000
Nitrogen: N content of ammonia	526,458	544,532	515,078	544,793	520,411
Olivine sand	606,087	791,988	1,102,739	1,280,000	1,120,000
Pyrites and pyrrhotite, gross weight	293,289	240,553	421,367	412,578	423,020
Sodium and potassium compounds, n.e.s.:					
Caustic soda	101,686	176,019	183,554	184,481	182,765
Sodium carbonate[e]	26,000	27,000	27,000	27,000	27,000
Stone:					
Dimension stone: Slate	51,813	50,000	50,625	NA	NA
Crushed and broken:					
Dolomite:					
Ground	80,322	97,111	116,944	NA	NA
Not further described	510,681	513,350	559,117	NA	NA
Limestone thousand tons	4,390	5,254	4,146	NA	NA
Nepheline syenite	231,273	241,131	231,339	223,152	[e]220,000
Quartz and quartzite	672,744	639,487	843,762	NA	NA
Sulfur:					
Pyrites, S content thousand tons	150	119	193	210	216
Byproduct of:					
Metallurgy do.	36	40	[e]40	[e]40	[e]40
Petroleum do.	7	6	[e]6	[e]6	[e]6
Total do.	193	165	239	[e]256	[e]262
Sulfuric acid (100%)	381	386	359	NA	NA

See footnotes at end of table.

Table 2.—Norway: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Talc, soapstone, steatite:					
Unground	35,754	34,294	35,270	[e]33,000	[e]33,000
Other	60,962	53,191	52,365	[e]52,000	[e]52,000
Total	96,716	87,485	87,635	[e]85,000	[e]85,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades	402,084	280,280	288,412	312,754	335,511
Coke, all grades	320,205	336,541	343,941	340,817	332,531
Gas:					
Manufactured ——million cubic feet	579	563	458	410	284
Natural:					
Gross[e] ——do	550,000	790,000	960,000	958,000	932,838
Marketed ——do	525,865	759,482	922,065	919,859	896,950
Peat:[e]					
For agricultural use	60,000	60,000	60,000	60,000	60,000
For fuel use	1,100	1,200	1,200	1,200	1,200
Petroleum:					
Crude ——thousand 42-gallon barrels	127,163	140,111	181,692	175,361	183,010
Refinery products:					
Gasoline, motor ——do	7,490	10,318	9,941	10,060	10,234
Jet fuel ——do	1,762	1,956	1,321	4,190	3,613
Kerosine ——do	2,807	3,663	3,548	3,670	3,131
Distillate fuel oil ——do	23,728	27,534	25,966	26,051	26,026
Residual fuel oil ——do	11,674	14,601	11,876	8,689	7,973
Lubricants ——do	33	30	31	NA	NA
Other ——do	1,721	6,381	6,545	1,022	1,479
Refinery fuel and losses ——do	5,981	5,013	3,342	[e]2,684	2,623
Total ——do	55,196	69,496	62,570	56,366	55,079

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 26, 1983.

[2]Less than 1/2 unit.

[3]Data represent exports, presented instead of actual production data, which are reported in official sources as not available for publication. A part of these exports may be derived from imported materials.

[4]Excludes nepheline syenite, which is included under "Stone."

TRADE

In 1982, Norway's favorable foreign trade balance fell from about $2.3 billion to $0.9 billion. Crude oil and natural gas exports valued at about $9 billion represented about 47% of all exports.

Table 3.—Norway: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	1,847	--	--	
Oxides and hydroxides	35	27	--	Finland 25.
Metal including alloys:				
Scrap	18,591	18,620	--	West Germany 8,099; Sweden 3,543; Italy 2,829.
Unwrought	521,183	523,961	12,721	West Germany 190,727; United Kingdom 77,828; Netherlands 68,417.
Semimanufactures	66,044	68,650	8,842	United Kingdom 16,288; Denmark 7,205; West Germany 7,014.
Antimony: Metal including alloys, all forms ——value	NA	$697	--	NA.
Beryllium: Metal including alloys, all forms ——do	$1,000	--		
Cadmium: Metal including alloys, all forms	NA	94	--	NA.

See footnotes at end of table.

Table 3.—Norway: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Chromium:				
Oxides and hydroxides	1	2	--	All to Canada.
Metal including alloys, all forms	NA	63	--	NA.
Cobalt:				
Oxides and hydroxides	NA	1	NA	NA.
Metal including alloys, all forms	NA	1,638	--	NA.
Copper:				
Ore and concentrate	89,498	97,387	--	Sweden 36,237; West Germany 30,719; Finland 25,131.
Oxides and hydroxides	NA	5,178	NA	Tanzania 1,500; undetermined 3,650.
Sulfate	NA	169	NA	Sweden 158.
Ash and residue containing copper	NA	5,250	--	Spain 4,200; Sweden 900; West Germany 67.
Metal including alloys:				
Scrap	4,166	5,851	--	Sweden 2,416; West Germany 2,319; Belgium-Luxembourg 536.
Unwrought	34,882	31,332	370	West Germany 12,123; France 5,024; United Kingdom 4,436.
Semimanufactures	3,410	2,790	72	West Germany 1,198; Sweden 1,140; Finland 134.
Gold:				
Waste and sweepings value, thousands	$2,309	$1,636	--	United Kingdom $975; Sweden $283; Denmark $179.
Metal including alloys, unwrought and partly wrought troy ounces	8,263	14,822	NA	West Germany 9,420; United Kingdom 1,768; Italy 1,543.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	2,722	3,482	--	West Germany 1,351; United Kingdom 1,345; Poland 279.
Pyrite, roasted	53,609	184,305	--	West Germany 131,238; United Kingdom 27,621; Denmark 18,881.
Metal:				
Scrap	38,491	32,536	4	Sweden 11,592; Denmark 11,184; West Germany 8,730.
Pig iron, cast iron, related materials	104,329	70,592	--	United Kingdom 32,643; West Germany 15,138; Sweden 4,938.
Ferroalloys:				
Ferrochromium	NA	10,540	1,000	West Germany 2,578; Sweden 2,107; United Kingdom 1,528.
Ferromanganese	245,505	209,614	4,881	West Germany 42,916; Belgium-Luxembourg 29,645; Sweden 24,239.
Ferrosilicochromium	NA	948	NA	Belgium-Luxembourg 537; Sweden 225; United Kingdom 132.
Ferrosilicomanganese	NA	183,737	15,624	West Germany 71,391; United Kingdom 18,848; Italy 16,277.
Ferrosilicon	268,894	271,438	NA	West Germany 86,581; United Kingdom 47,711; Sweden 20,375.
Unspecified	194,800	8,744	290	United Kingdom 4,331; West Germany 1,023; Sweden 971.
Steel, primary forms	211,617	227,676	30,509	Netherlands 99,534; Denmark 25,486; United Kingdom 17,913.
Semimanufactures:				
Bars, rods, angles, shapes, sections	246,547	240,312	6,010	Sweden 56,356; United Kingdom 52,980; West Germany 47,343.
Universals, plates, sheets	141,699	138,935	--	United Kingdom 45,711; Sweden 33,680; Denmark 26,857.
Hoop and strip	7,582	6,626	--	Sweden 6,472; West Germany 85; Denmark 56.
Rails and accessories	437	2,340	--	Sweden 2,106; West Germany 200.
Wire	7,184	7,887	1,414	United Kingdom 1,889; Lebanon 845; Iran 809.
Tubes, pipes, fittings	40,515	48,965	4,469	Sweden 17,515; United Kingdom 13,142; Finland 3,910.
Castings and forgings, rough	12,783	8,701	(1)	Sweden 4,783; Denmark 2,362; Ireland 469.
Lead:				
Ore and concentrate	3,754	5,161	--	All to West Germany.
Oxides	11	10	--	Sweden 9.
Metal including alloys:				
Scrap	8,753	8,020	--	Denmark 4,990; Sweden 1,911; West Germany 874.
Unwrought	125	31	--	Sweden 26; Finland 5.
Semimanufactures	2	1	--	All to Tanzania.

See footnotes at end of table.

Table 3.—Norway: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Scrap	2	17	--	All to West Germany.
Unwrought value, thousands	$97,389	$71,059	NA	NA.
Semimanufactures	207	121	--	West Germany 107; Sweden 9; Belgium-Luxembourg 5.
Manganese:				
Ore and concentrate, metallurgical-grade	1,955	2,561	--	West Germany 1,461; United Kingdom 1,100.
Metal including alloys, all forms	NA	282	--	Netherlands 197; West Germany 85.
Mercury 76-pound flasks	2,842	2,002	--	Czechoslovakia 1,962.
Metalloids:				
Silicon	NA	53,381	1,958	U.S.S.R. 15,257; West Germany 13,704; United Kingdom 8,764.
Unspecified	60,586	13	--	United Kingdom 12.
Molybdenum: Metal including alloys, all forms value	$405	$18,121	--	Mainly to Japan.
Nickel:				
Ore and concentrate	13,773	4,795	--	All to Finland.
Metal including alloys:				
Scrap	391	551	46	Austria 334; Belgium-Luxembourg 104; West Germany 35.
Unwrought	31,250	36,963	16,464	United Kingdom 5,537; West Germany 2,837; Canada 2,366.
Semimanufactures	78	12	--	Denmark 4; Sweden 3; Peru 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified troy ounces	26,782	34,080	30,190	Netherlands 2,958; United Kingdom 322.
Silver:				
Waste and sweepings[2] value, thousands	$1,340	$1,581	--	West Germany $619; United Kingdom $519; Sweden $374.
Metal including alloys, unwrought and partly wrought troy ounces	854,381	796,830	NA	Sweden 317,780; West Germany 232,998; Finland 75,683.
Tin: Metal including alloys:				
Scrap	52	50	--	Denmark 28; West Germany 14; United Kingdom 8.
Unwrought	7	11	(1)	West Germany 4; Denmark 3; Sweden 3.
Semimanufactures	4	6	(1)	Denmark 2; Sweden 2; Finland 1.
Titanium:				
Ore and concentrate	779,741	619,329	NA	NA.
Oxides	1,137	1,110	--	Sweden 843; Denmark 260; Finland 5.
Tungsten: Metal including alloys, all forms value	$7,000	$8,712	--	Denmark $3,000; West Germany $3,000.
Uranium and/or thorium: Metal including alloys, all forms do	$5,000	$2,614	$2,614	
Zinc:				
Ore and concentrate	6,395	18,349	--	Belgium-Luxembourg 12,706; West Germany 5,643.
Oxides	669	601	--	Sweden 311; Denmark 270; United Arab Emirates 11.
Blue powder	5,044	5,743	NA	Denmark 896; West Germany 780; Finland 732.
Ash and residue containing zinc	NA	3,515	--	West Germany 2,229; United Kingdom 977.
Metal including alloys:				
Scrap	1,332	2,254	--	West Germany 1,927; Netherlands 107; United Kingdom 101.
Unwrought	65,739	65,707	12,165	West Germany 13,749; Sweden 13,622; United Kingdom 10,636.
Semimanufactures	368	284	20	Sweden 187; Denmark 76.
Other:				
Oxides and hydroxides	3,028	57	13	United Kingdom 26; West Germany 16.
Ashes and residues	119,065	17,711	--	Sweden 6,207; West Germany 3,589; Finland 2,678.
Pyrophoric alloys	436	563	NA	Netherlands 283; Denmark 91; Sweden 63.
Cermets	NA	1	--	NA.
Base metals including alloys, all forms	1,287	32	--	Sweden 23; United Kingdom 6.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	(1)	21	--	West Germany 19; Denmark 1.
Artificial:				
Corundum	10	11	--	United Arab Emirates 4; Sweden 3; West Germany 2.
Silicon carbide	NA	52,047	NA	NA.
Dust and powder of precious and semi-precious stones including diamond kilograms	--	99	NA	NA.
Grinding and polishing wheels and stones	767	736	7	Finland 175; Sweden 170; Poland 131.
Asbestos, crude	--	10	--	Morocco 7; Sweden 3.
Barite and witherite	271	3,612	--	United Kingdom 1,223; Ivory Coast 1,203; Finland 1,113.

See footnotes at end of table.

Table 3.—Norway: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Cement	524,970	303,264	88,387	United Arab Emirates 108,578; Venezuela 48,075; Ghana 37,642.
Chalk	40	3	--	Singapore 1.
Clays and clay products:				
Crude, unspecified	21	70	12	Finland 32; Denmark 10; Sweden 6.
Products:				
Nonrefractory value, thousands	$2,872	$2,793	--	West Germany $1,982; France $681; Gambia $53.
Refractory including nonclay brick	6,576	3,782	--	West Germany 1,922; Sweden 858; Denmark 262.
Cryolite and chiolite	10	--		
Diamond: Gem, not set or strung thousand carats	15	10	(1)	Belgium-Luxembourg 4; Switzerland 3.
Diatomite and other infusorial earth	11	45	--	All to France.
Feldspar, fluorspar, related materials:				
Feldspar	NA	77,634	--	West Germany 23,494; United Kingdom 14,010; East Germany 10,075.
Fluorspar	NA	5	--	NA.
Unspecified	310,662	228,392	--	Netherlands 67,066; United Kingdom 40,481; West Germany 31,673.
Fertilizer materials:				
Crude, unspecified	--	5	--	All to Sweden.
Manufactured:				
Ammonia value, thousands	$1,197	$8,382	NA	NA.
Nitrogenous do	$99,995	$98,706	--	NA.
Phosphatic	100	252	--	All to Sweden.
Potassic	3,138	1	NA	NA.
Unspecified and mixed value, thousands	$152,804	$130,145	NA	NA.
Graphite, natural	10,675	8,274	NA	NA.
Gypsum and plaster	8,878	43	--	Tanzania 35; Sweden 7.
Halogens:				
Chlorine value	$214,610	$275,808	NA	NA.
Unspecified do	$48,186	$174	NA	NA.
Lime	15,300	4,898	--	Liberia 4,500; Sweden 380.
Magnesium compounds: Magnesite	17,120	19,247	NA	NA.
Mica:				
Crude including splittings and waste	2,112	2,298	--	Netherlands 661; Portugal 298; France 169.
Worked including agglomerated splittings	1	3	--	Belgium-Luxembourg 2; Switzerland 1.
Pigments, mineral: Iron oxides and hydroxides, processed	NA	5	--	Singapore 3; United Arab Emirates 1.
Precious and semiprecious stones other than diamond: Natural thousand carats	5,915	5,950	--	NA.
Pyrite, unroasted	190,107	210,459	--	Italy 71,116; Egypt 35,000; Turkey 27,141.
Salt and brine	1,576	2,982	--	Sweden 2,278; Denmark 547; Greenland 28.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides value	$2,025	$1,045	--	All to Sweden.
Sodium carbonate, natural and manufactured	716	69	--	Sweden 53; Morocco 15.
Sodium hydroxide value, thousands	$13,833	$20,019	$884	Denmark $5,311; Sweden $4,769; Belgium-Luxembourg $3,403.
Sodium sulfate, natural and manufactured	5	817	NA	Sweden 667.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	124,669	96,364	543	France 32,082; West Germany 18,484; Italy 18,380.
Worked	13,106	12,519	18	Netherlands 10,213; West Germany 990; Belgium-Luxembourg 453.
Dolomite, chiefly refractory-grade	126,073	123,417	NA	NA.
Gravel and crushed rock thousand tons	2,164	2,223	--	West Germany 1,219; France 211; United Kingdom 188.
Limestone other than dimension	38,719	12,155	--	United Kingdom 6,716; Denmark 2,023; Sweden 1,884.
Quartz and quartzite	62,496	59,372	--	Iceland 56,915; West Germany 930; Denmark 663.
Sand other than metal-bearing	2,158	8,832	--	United Arab Emirates 4,339; Kuwait 2,300; Sweden 1,952.
Sulfur:				
Elemental:				
Crude including native and byproduct	1,842	4,405	--	United Kingdom 3,323; Netherlands 582; France 500.
Colloidal, precipitated, sublimed	--	1,919	--	United Kingdom 1,318; West Germany 600.
Sulfuric acid value, thousands	$5,191	$5,141	NA	NA.

See footnotes at end of table.

Table 3.—Norway: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Talc, steatite, soapstone, pyrophyllite	55,728	53,203	--	Netherlands 13,322; United Kingdom 12,243; Sweden 8,346.
Other:				
Crude	2	63	--	Sweden 50; France 13.
Slag and dross, not metal-bearing	9,258	5,250	--	Sweden 2,668; Finland 1,378; Netherlands 560.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	7,525	4,179	5	Sweden 2,754; Finland 1,057; Netherlands 171.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,024	4	--	Faroe Islands 2; West Germany 1; Liberia 1.
Carbon: Carbon black	15	18	--	Sweden 14; West Germany 2.
Coal:				
Anthracite	837	1,375	--	India 620; Taiwan 450; Sweden 305.
Bituminous	90,283	82,765	--	West Germany 81,242; Denmark 1,523.
Coke and semicoke	35,640	107,758	--	Romania 60,417; Sweden 26,531; Iceland 20,809.
Gas, natural, million cubic feet	(3)	889,834	--	West Germany 495,081; United Kingdom 394,753.
Hydrogen, helium, rare gases, value	NA	$355,954	NA	NA.
Peat including briquets and litter	16	16	--	Greece 14; Faroe Islands 2.
Petroleum and refinery products:				
Crude, thousand 42-gallon barrels	173,266	152,255	--	United Kingdom 133,885; West Germany 7,719; Netherlands 5,432.
Refinery products:				
Liquefied petroleum gas, do.	628	756	198	Denmark 257; Sweden 133; United Kingdom 117.
Gasoline, do.	4,523	6,165	85	United Kingdom 3,816; Denmark 805; Sweden 661.
Mineral jelly and wax, do.	16	15	--	Sweden 14.
Kerosine and jet fuel, do.	7	723	--	Sweden 165; Denmark 149; United Kingdom 128.
Distillate fuel oil, do.	5,731	6,393	480	Sweden 2,259; Denmark 1,527; Netherlands 692.
Lubricants, do.	25	22	(1)	Sweden 14; Denmark 2; Belgium-Luxembourg 1.
Residual fuel oil, do.	4,860	5,984	1,218	Sweden 1,104; West Germany 1,006; United Kingdom 781.
Bitumen and other residues, 42-gallon barrels	31,245	2,551	--	Sweden 2,460; United Kingdom 73.
Bituminous mixtures, do.	7,539	3,297	--	Kenya 3,030; United Kingdom 109; Sweden 79.
Petroleum coke, do.	495,765	536,762	--	Netherlands 255,200; United Kingdom 101,800; Hungary 77,809.
Tars and other crude chemicals derived from coal, gas, and petroleum	47,087	49,873	--	Netherlands 33,415; Denmark 11,866; Belgium-Luxembourg 4,550.

NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]Unreported quantity valued at $2,616,661,000.

Table 4.—Norway: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals, unspecified	202	175	20	West Germany 92; France 33; Sweden 10.
Aluminum:				
Ore and concentrate	6,894	(1)	--	NA.
Oxides and hydroxides - thousand tons	1,479	1,243	3	Jamaica 390; Suriname 310; Australia 283.
Metal including alloys:				
Scrap	2,503	148	--	Spain 51; Finland 42; Yugoslavia 26.
Unwrought	16,399	14,816	727	Sweden 5,217; West Germany 4,657; United Kingdom 2,686.
Semimanufactures	45,552	43,457	332	West Germany 23,249; Sweden 5,944; Finland 3,050.
Antimony: Metal including alloys, all forms	NA	20	--	NA.
Beryllium: Metal including alloys, all forms ---------- value	$810	$5,227	$3,000	Denmark $1,000; France $1,000.
Cadmium: Metal including alloys, all forms ---------- do	NA	$1,045	NA	NA.
Chromium:				
Ore and concentrate	293	27,203	--	Albania 27,183; Finland 20.
Oxides and hydroxides	208	146	--	West Germany 76; Sweden 23; Italy 20.
Metal including alloys, all forms	NA	1	NA	NA.
Cobalt:				
Oxides and hydroxides	6	3	--	West Germany 2; United Kingdom 1.
Metal including alloys, all forms	NA	502	57	Canada 293; Netherlands 134; Belgium-Luxembourg 13.
Columbium and tantalum: Metal including alloys, all forms: Tantalum	(1)	3	--	North Korea 2.
Copper:				
Matte and speiss including cement copper	3	4	--	Mainly from West Germany.
Oxides and hydroxides	NA	38	NA	West Germany 20.
Sulfate	NA	903	NA	U.S.S.R. 430; Belgium-Luxembourg 420.
Metal including alloys:				
Scrap	331	232	108	Sweden 64; Canada 55.
Unwrought	2,259	2,260	1	Sweden 887; United Kingdom 682; Belgium-Luxembourg 512.
Semimanufactures	27,844	29,124	74	West Germany 11,954; Sweden 6,984; Belgium-Luxembourg 4,298.
Gold:				
Waste and sweepings value, thousands	$1,569	$237	NA	Denmark $109; United Kingdom $71.
Metal including alloys, unwrought and partly wrought ---------- troy ounces	35,270	23,824	3,504	West Germany 11,124; United Kingdom 5,948; Switzerland 2,315.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	87,101	11,196	--	Sweden 11,171; Netherlands 25.
Metal:				
Scrap	52,925	23,571	36	United Kingdom 11,772; Denmark 4,605; Iceland 2,144.
Pig iron, cast iron, related materials	17,121	14,649	1	West Germany 5,817; Sweden 2,912; Netherlands 2,049.
Ferroalloys:				
Ferrochromium	NA	1	NA	NA.
Ferromanganese	330	60	15	West Germany 20; France 10; United Kingdom 10.
Ferromolybdenum	NA	39	NA	Sweden 19; United Kingdom 14; Austria 3.
Ferrosilicon	1,157	2,460	NA	Iceland 1,426; Yugoslavia 1,014.
Unspecified	438	546	6	France 83; United Kingdom 40; unspecified 407.
Steel, primary forms	195,494	123,545	(1)	Netherlands 84,055; West Germany 32,482; Belgium-Luxembourg 2,030.
Semimanufactures:				
Bar, rods, angles, shapes, sections	309,631	260,726	56	West Germany 78,813; Sweden 61,017; France 31,733.
Universals, plates, sheets	584,862	536,419	3	Sweden 116,931; West Germany 98,159; Belgium-Luxembourg 84,150.
Hoop and strip	38,893	34,450	3	West Germany 9,141; Sweden 6,790; Austria 4,845.
Rails and accessories	29,410	21,657	--	Sweden 17,423; West Germany 2,403; Austria 1,131.
Wire	16,759	13,926	219	Belgium-Luxembourg 6,154; Sweden 4,195; Netherlands 882.
Tubes, pipes, fittings	177,895	152,420	1,308	West Germany 61,634; France 19,266; Sweden 14,679.
Castings and forgings, rough	5,396	4,394	4	Denmark 2,163; Sweden 1,097; West Germany 458.

See footnotes at end of table.

Table 4.—Norway: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate—value	--	$46,167	--	All from Sweden.
Oxides	1,032	1,236	5	West Germany 850; United Kingdom 277; Sweden 103.
Metal including alloys:				
Scrap	87	16	--	Denmark 10; Sweden 6.
Unwrought	13,608	11,779	101	United Kingdom 5,412; Denmark 3,873; Sweden 2,059.
Semimanufactures	1,415	1,147	(1)	Netherlands 663; Sweden 128; Belgium-Luxembourg 98.
Magnesium: Metal including alloys:				
Scrap	--	21	--	All from Sweden.
Unwrought	366	301	251	France 23; Yugoslavia 10.
Semimanufactures	24	33	6	Switzerland 10; West Germany 9; Sweden 5.
Manganese:				
Ore and concentrate, metallurgical-grade	807,700	484,640	--	Republic of South Africa 191,456; Gabon 149,109; Australia 79,743.
Oxides	815	549	(1)	Netherlands 410; West Germany 48; Belgium-Luxembourg 41.
Metal including alloys, all forms	NA	351	133	Republic of South Africa 217.
Mercury—76-pound flasks	29	29	--	Mainly from China.
Metalloids:				
Selenium	NA	5	--	All from Sweden.
Silicon	NA	1	--	All from Denmark.
Unspecified	84	(1)	--	NA.
Molybdenum: Metal including alloys, all forms	2	2	1	Austria 1.
Nickel:				
Matte and speiss	89,855	84,252	--	Canada 69,901; United Kingdom 6,611; Republic of South Africa 3,430.
Metal including alloys:				
Scrap	7	21	4	United Kingdom 17.
Unwrought	80	188	150	Canada 14; U.S.S.R. 10; Belgium-Luxembourg 4.
Semimanufactures	274	171	10	West Germany 73; United Kingdom 57; Sweden 16.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified—troy ounces	5,530	7,781	NA	United Kingdom 3,537; West Germany 1,704; Switzerland 1,318.
Silver:				
Waste and sweepings[2] value, thousands	$7,601	$2,287	--	Sweden $1,436; Finland $386; Denmark $268.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,006	1,837	NA	West Germany 580; United Kingdom 558; Switzerland 370.
Tin: Metal including alloys:				
Scrap	7	11	--	Sweden 7; Denmark 4.
Unwrought	614	557	(1)	United Kingdom 449; Denmark 75; Malaysia 18.
Semimanufactures	335	247	(1)	United Kingdom 133; West Germany 39; Denmark 35.
Titanium:				
Ore and concentrate	NA	60	--	NA.
Oxides	491	1,053	125	West Germany 871; United Kingdom 56.
Tungsten: Metal including alloys, all forms	5	2	(1)	NA.
Uranium and/or thorium: Metal including alloys, all forms—value	$202	$174	NA	NA.
Zinc:				
Ore and concentrate	81,839	109,986	10,563	Sweden 99,423.
Oxides	2,217	2,002	--	West Germany 976; Netherlands 525; East Germany 243.
Blue powder	42	15	--	NA.
Ash and residue containing zinc	NA	28,731	--	Sweden 27,441; Denmark 1,285.
Metal including alloys:				
Scrap	2,414	3,123	--	Sweden 1,979; Denmark 847; Finland 277.
Unwrought	1,051	448	--	Netherlands 252; United Kingdom 80; Sweden 63.
Semimanufactures	609	593	(1)	France 246; Sweden 78; West Germany 68.
Other:				
Ores and concentrates	652	80	--	NA.
Oxides and hydroxides	235	176	3	United Kingdom 106; Finland 25.
Ashes and residues	24,098	167,270	--	West Germany 166,286; Sweden 636; Denmark 348.
Pyrophoric alloys	308	148	NA	Canada 105; United Kingdom 27.
Cermets	NA	3	NA	NA.
Base metals including alloys, all forms	964	35	5	Sweden 15; United Kingdom 7.

See footnotes at end of table.

Table 4.—Norway: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	20,492	18,125	74	Iceland 15,951; Portugal 1,007; West Germany 924.
Artificial:				
Corundum	1,558	1,032	(1)	West Germany 828; France 103; Austria 88.
Silicon carbide	NA	1,357	993	Poland 250; Netherlands 69; West Germany 42.
Dust and powder of precious and semi-precious stones including diamond kilograms	33	34	NA	NA.
Grinding and polishing wheels and stones	1,060	1,163	100	Austria 284; West Germany 246; Sweden 225.
Asbestos, crude	103	149	NA	Canada 80.
Barite and witherite	111,392	100,991	--	Morocco 54,976; Netherlands 16,432; Ireland 13,897.
Boron materials:				
Crude natural borates	8,392	5,910	5,510	Turkey 300; West Germany 100.
Oxides and acids	370	249	11	France 205; Italy 20; Sweden 5.
Cement	5,639	4,979	(1)	Denmark 1,910; United Kingdom 1,680; Finland 605.
Chalk	9,067	9,334	26	Denmark 4,713; Sweden 3,772; France 555.
Clays and clay products:				
Crude:				
Bentonite	NA	48,315	7,652	Italy 26,300; Greece 5,440; United Kingdom 4,074.
Kaolin	NA	67,529	NA	United Kingdom 62,812; Czechoslovakia 3,243.
Unspecified	154,558	27,474	289	United Kingdom 10,684; Czechoslovakia 5,119; France 4,499.
Products:				
Nonrefractory value, thousands	$13,769	$13,850	$2	West Germany $3,753; Italy $2,770; Netherlands $2,305.
Refractory including nonclay brick	33,733	30,632	62	Sweden 11,942; United Kingdom 5,633; West Germany 4,631.
Cryolite and chiolite	6,240	4,547	--	All from Denmark.
Diamond:				
Gem, not set or strung thousand carats	10	100	(1)	Sweden 40; Belgium-Luxembourg 10; United Kingdom 5.
Industrial value	$81,000	$33,104	--	United Kingdom $27,000; Netherlands $4,000.
Diatomite and other infusorial earth	1,939	1,807	365	Iceland 580; Sweden 463; Denmark 130.
Feldspar, fluorspar, related materials:				
Feldspar	NA	71	--	France 69.
Fluorspar	NA	43,319	--	Morocco 12,606; Spain 10,242; East Germany 9,054.
Unspecified	48,843	--		
Fertilizer materials:				
Crude, unspecified	63	214	--	Sweden 116; West Germany 73; Denmark 25.
Manufactured:				
Ammonia	94,756	48,576	(1)	U.S.S.R. 27,968; France 20,132; Sweden 474.
Nitrogenous	1,531	5,447	--	East Germany 4,918; Sweden 170; West Germany 134.
Phosphatic	5,808	4,421	--	Sweden 3,741; Netherlands 619; Denmark 35.
Potassic	319,473	287,962	1	France 81,413; West Germany 69,986; U.S.S.R. 28,083.
Unspecified and mixed	6,883	4,234	(1)	Sweden 2,639; Netherlands 1,470; Denmark 96.
Graphite, natural	757	861	1	Sweden 562; United Kingdom 243; West Germany 54.
Gypsum and plaster	168,465	124,714	1	France 78,626; Sweden 32,047; Spain 12,033.
Halogens:				
Chlorine	354	436	2	Sweden 432.
Unspecified	87	101	(1)	United Kingdom 46; Netherlands 44; Chile 11.
Lime	12,886	11,764	10	Sweden 7,685; Denmark 3,158; United Kingdom 833.
Magnesium compounds: Magnesite	4,508	3,840	20	Austria 1,674; China 912; North Korea 506.
Mica:				
Crude including splittings and waste	2,169	1,871	55	India 1,577; Denmark 120; Austria 50.
Worked including agglomerated splittings	75	50	1	Switzerland 29; Belgium-Luxembourg 11; West Germany 3.

See footnotes at end of table.

Table 4.—Norway: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Nitrates, crude	221	369	--	All from West Germany.
Phosphates, crude	477,212	402,098	36,252	U.S.S.R. 153,622; Israel 127,007; Sweden 80,347.
Pigments, mineral: Iron oxides and hydroxides, processed	2,540	2,565	--	West Germany 2,544; Spain 10.
Precious and semiprecious stones other than diamond:				
Natural thousand carats	57,530	59,255	NA	Brazil 23,645; West Germany 3,205; Belgium-Luxembourg 1,805.
Synthetic do	105	200	NA	NA.
Salt and brine	453,609	518,190	3	Netherlands 348,445; Spain 56,602; Tunisia 35,004.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,450	1,656	(1)	Sweden 1,472; West Germany 62; France 60.
Sodium carbonate, natural and manufactured	56,693	47,390	--	Netherlands 25,858; United Kingdom 5,732.
Sodium hydroxide	9,645	5,812	--	Netherlands 1,781; Belgium-Luxembourg 1,773; United Kingdom 1,163.
Sodium sulfate, natural and manufactured	9,361	3,656	NA	Sweden 2,596; Netherlands 455; U.S.S.R. 418.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7,942	6,848	--	Sweden 2,148; West Germany 1,404; Finland 1,080.
Worked	5,978	5,756	--	Portugal 2,141; Sweden 2,002; Poland 696.
Dolomite, chiefly refractory-grade	8,313	7,052	299	United Kingdom 5,532; Sweden 619; West Germany 575.
Gravel and crushed rock	79,722	76,342	(1)	Sweden 73,244; Denmark 1,757; Italy 402.
Limestone other than dimension	198,067	166,006	55	United Kingdom 145,206; Sweden 12,199; Denmark 8,522.
Quartz and quartzite	402,658	371,903	18	Spain 265,898; Sweden 94,351; United Kingdom 7,813.
Sand other than metal-bearing	212,341	212,415	188	Belgium-Luxembourg 111,361; Sweden 69,565; United Kingdom 10,034.
Sulfur:				
Elemental:				
Crude including native and byproduct	2,853	3,008	7	Sweden 2,786; West Germany 155; Belgium-Luxembourg 37.
Colloidal, precipitated, sublimed	17	21	--	West Germany 10; Netherlands 10.
Dioxide	NA	138	--	United Kingdom 100; West Germany 37.
Sulfuric acid	155	145	--	Denmark 89; Netherlands 41; West Germany 11.
Talc, steatite, soapstone, pyrophyllite	6,878	5,608	--	Finland 2,571; India 2,084; Austria 420.
Other:				
Crude	81,998	87,371	7	West Germany 82,679; East Germany 2,278; Sweden 2,028.
Slag and dross, not metal-bearing	61,492	32,168	--	Sweden 17,716; Belgium-Luxembourg 5,554; Denmark 4,910.
Oxides and hydroxides of barium, magnesium, strontium	166	182	11	France 68; West Germany 54; United Kingdom 35.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	3,803	8,404	29	Denmark 2,333; Finland 2,164; Sweden 1,926.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	51	114	110	Trinidad and Tobago 4.
Carbon: Carbon black	5,121	4,804	64	Sweden 2,750; West Germany 1,538; United Kingdom 309.
Coal:				
Anthracite	103,425	79,128	6,339	United Kingdom 43,984; West Germany 27,656; Belgium-Luxembourg 1,148.
Bituminous	635,014	613,569	352,099	Poland 118,315; France 84,352; United Kingdom 25,306.
Briquets of anthracite and bituminous coal	782	93	52	West Germany 39.
Lignite including briquets	1,128	5	--	All from United Kingdom.
Coke and semicoke	531,005	492,448	13,100	United Kingdom 302,052; West Germany 57,027; France 7,796.
Hydrogen, helium, rare gases	NA	1,794	27	United Kingdom 723; Sweden 396; West Germany 366.
Peat including briquets and litter	12,098	14,642	--	Sweden 12,193; U.S.S.R. 823; Denmark 765.

See footnotes at end of table.

Table 4.—Norway: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products:				
Crude ___ thousand 42-gallon barrels__	46,797	28,475	__	United Kingdom 19,379; Saudi Arabia 4,962; U.S.S.R. 1,876.
Refinery products:				
Liquefied petroleum gas____do____	9,397	9,011	__	NA.
Gasoline _____do____	5,098	4,713	19	Netherlands 1,529; Sweden 1,134; West Germany 1,019.
Mineral jelly and wax _____do____	98	98	(1)	West Germany 69; United Kingdom 12; Hungary 6.
Kerosine and jet fuel_____do____	2,262	1,723	232	Netherlands 486; France 425; United Kingdom 126.
Distillate fuel oil _____do____	9,560	7,518	216	Sweden 2,323; Belgium-Luxembourg 1,149; U.S.S.R. 993.
Lubricants_____do____	673	539	15	Sweden 152; United Kingdom 133; Denmark 99.
Residual fuel oil_____do____	5,291	5,649	122	East Germany 1,200; West Germany 1,135; Sweden 803.
Bitumen and other residues _do____	868	808	(1)	Netherlands 392; Sweden 177; Denmark 158.
Bituminous mixtures _____do____	27	15	1	Sweden 7; United Kingdom 3; Belgium-Luxembourg 1.
Petroleum coke _____do____	1,647	1,513	1,425	United Kingdom 43; West Germany 32; Netherlands 7.
Tars and other crude chemicals derived from coal, gas, and petroleum_____	130,618	120,365	(1)	West Germany 53,182; United Kingdom 44,336; Denmark 10,662.

NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Expansion of metal production capacity at Norsk Hydro's Karmöy smelter from 110,000 to 160,000 tons per year was completed. Construction of a new billet foundry for 80,000 tons per year was also completed on the premises. A second power transmission line was built across the Karmsund Sound to the aluminum plant, to prevent incidents similar to the one that occurred at the end of 1981, when the plant was shut down by a power failure because of a storm.

Aluminum market conditions suffered also under the severe slump in the national economy, with weak demand and low prices, but Elkem's Lista and Mosjöen plants could sell their entire production.

In 1982, five companies continued to operate eight aluminum smelters with a total capacity of 800,000 tons primary metal. The largest producer remained the Årdal og Sunndal Verk AS with plants at Årdal, Sunndalsöra, and Höyanger, with a total capacity of 374,000 tons per year. The second was Mösal Aluminium AS, with plants at Mosjöen and Lista, Farsund, with a 170,000-ton-per-year total capacity. Norsk Hydro's Karmöy plant was next with a capacity of 160,000 tons per year, followed by Sör-Norge Aluminium AS at Husnes, with 72,000 tons per year, and Det Norske Nitrid AS at Tyssedal, with 24,000 tons of aluminum per year.

Copper.—The operating concession for AS Sulitjelma Gruber at Sulitjelma was to expire July 6, 1983, and Elkem stated that it was not going to operate the mines beyond that date. The Norwegian Government also had no plans to operate the mines, and Norwegian courts will decide the question of nonreverting assets according to the Norwegian Concessions Act.

In 1982, Norway had 7 copper and pyrite mines in operation employing 1,221 workers and producing 108,871 tons of copper concentrates valued at about $30 million.

Ferroalloys.—Five of Norway's six ferroalloy producers, who have been negotiating for months about merging their ferroalloy activities, have decided that this is not feasible, because of unbridgeable differences in size, ownership structure, and Norwegian electricity concession laws that make difficult the transfer of power sup-

plies. The companies, Orkla Metall AS, Elkem, Bjölvefossen AS, Ila og Lilleby, and Hafslund AS, had sales of about $280 million and employed 3,500. The sixth company, Tinfos Jernverk AS, took no part in the merger talks.

Nevertheless, the companies, which control about one-fifth of the world's supply of ferroalloys, decided to meet again sometime in the future to strengthen natural collaboration.

Bjölvefossen, Norway's only ferrochrome producer, may be forced to shut down its ferrochrome furnaces in 1983 if the Government goes ahead with enforcing stringent new air pollution regulations that would cost $3 million. In 1982, the company lost $750,000 on sales of $19 million. Recently, the company has produced 11,000 to 12,000 tons of ferrochrome annually, 80% of which was low-carbon type.

Iron and Steel.—Merger talks between Norsk Jernverk AS and Elkem continued through 1982, but no early agreement was expected. After estimated 1982 losses of about $60 million, state-owned Norsk Jernverk released its corporate plan asking the Norwegian Government to provide $280 million in new funding over the next 3 years for paying its debts and to cover future losses and needed investments to make the company profitable again.

Norsk Jernverk's interest payments in 1982 amounted to 15% of its turnover. Items required by the company to become self-supporting included a new quay to help increase ore exports from 500,000 to 900,000 tons per year, adoption of SKF AB's Plasmamelt liquid ironmaking process, closing down the company's section mill, expansion of the cold mill and strip coating plants by 40% to 170,000 tons per year by 1984-85, and various further improvements, all at the Bergen plant. The company has also tried to diversify away from steel; ferroalloy making and aluminum are also being discussed because of the availability of inexpensive hydropower.

In 1982, Norway's iron ore production capacity was about 4 million tons, the largest producers being the Government-owned Sydvaranger's Sör-Varanger Mine near Kirkenes with a capacity of 2.3 million tons per year, Government-owned Norsk Jernverk's Rana Mine near Mo with 1.2 million tons, Fosdalens Bergverks AS's Verran Mine in Nord-Tröndelag with 510,000 tons, and Titania AS's Sokndal Mine, southern Norway, with about 50,000 tons. Elkem's Rødsand Mine at Nesset with a capacity of 150,000 tons per year was closed.

Elkem has phased out pig iron production at its ferroalloy plant at Bremanger Smelterverk, Svelgen.

Magnesium.—Work continued on the expansion from 50,000 to 60,000 tons per year of Government-owned Norsk Hydro's magnesium smelter at Porsgrunn, south of Oslo. Modernization was expected to improve energy efficiency of the plant by 20%. During this time in 1982, and continuing in 1983, production of the plant was less than 60% of its original capacity. In the meantime, the Government allocated the extra power needed by the plant after the expansion.

Titanium.—Norway's only titanium dioxide plant was the 25,000-ton-per-year sulfate processing facility at Frederikstadt, south of Oslo. This plant, built in 1966, was operated by Kronos Tital AS, a subsidiary of NL Industries Inc. of the United States.

During 1982, the plant was operating close to capacity, using 84,000 tons of sulfuric acid of the Borregaard Group's 300,000-ton-per-year pyrite-based plant located in nearby Sarpsborg. Ilmenite from the company's own Tellnes deposit near Sokndal, southwest Norway, was the feedstock. Waste sulfate liquor was pumped mostly into the Glomma River.

Zinc.—The Board of Directors of Norzinc AS, a Boliden AB (Sweden) subsidiary, was to review in 1983 the $50 million remodeling plan at the company's Odda plant, southeast of Bergen, that was to expand capacity from 80,000 to 120,000 tons per year. Norzinc had a serious problem with effluent disposal in the sea causing heavy-metals pollution. The Government has given the company until 1986 to solve the problem.

NONMETALS

Ammonia.—In 1982, Norsk Hydro's domestic ammonia capacity at its Mongstad, west coast plant was 300,000 tons per year, while the company's worldwide capacity remained 2,145,000 tons per year.

Caustic Magnesia.—Norsk Hydro operated a caustic magnesia plant at Porsgrunn, with a capacity of 25,000 tons per year.

Granite.—Norway produced granites of different colors: white (diorite) at Tolga and Stören; grey at Iddefjorden, Fredrikstad, and Hvaler; and red granite at Drammen and Grorud. Black granite (hyperite) was produced at Solör. All granite mines are located in the south of the country. Granite veneer was exported for building-facing

purposes.

Larvikite.—Larvikite was quarried in the Larvik district and near Sanderfjord. It is used as an ornamental stone and for facing buildings because of its blue color and Schiller structure (iridescence).

MINERAL FUELS

In 1982, about 88% of Norway's primary energy output was petroleum and natural gas, 11.5% was hydroelectric power, and an insignificant 0.5% was bituminous coal. More than three-quarters of the oil and all natural gas produced were exported, contributing 47% of all exports.

Coal.—Government-owned Store Norske Spitsbergen Kullkompani continued production of bituminous coal on Svalbard Island. Plans were to increase production from the heavily subsidized Longyearbyen and Svea Mines to 1 million tons per year. About 780 Norwegians were working on the island as part of a 1,500-person colony that supplied the Norwegian Norsk Koksverk, various ferroalloy producers, and Norcem with coal.

The Soviet-owned company, Arktikugol, operated the Barentsburg and Pyramiden Mines on the basis that the U.S.S.R. is a cosignitory of the Svalbard Treaty, which allows free mining to the signatories, with no material advantage to Norway. About 2,500 people live in this community, which produces about 400,000 tons of coal per year.

An expedition of about 20 Finns were drilling a coal deposit in the Gipsdalen Valley of Svalbard. Finland is also a cosignatory of the Svalbard Treaty and can also mine freely on Svalbard. A consortium of 4 Finnish companies, Outokumpu Oy, Rautaruukki Oy, Imatra Power, and Neste Oy, sponsored the venture, whose goal was to produce at least 1 million tons per year, with a colony of 230 people. At present, Finland could use 4 to 5 million tons of coal per year.

Petroleum and Natural Gas.—The 1981 decline in North Sea oil production was reversed, as an increase of almost 5% was recorded. Although the Ekofisk Field continued a fairly steep decline, the output of the Statfjord Field, which straddled the Norwegian-British boundary, exceeded expectations with 233,000 barrels per day overall, of which Norway's share was 196,000 barrels per day. A further rise of up to 50% was expected in 1983, after the November 1982 startup of the B platform. Reserves at Statfjord were estimated at 283 to 470 million tons of oil equivalent; reserves at Ekofisk were less than 3 billion barrels of oil equivalent and depend on the success of a $2 billion water flood and gas lift project for central Ekofisk.

In 1982, Amoco's Vahall Field on the southern border of Ekofisk started production, and British Petroleum Co. decided to develop the Ula Field, north of Ekofisk.

The Gullfaks Field in block 34/10 was scheduled to start production in 1987, with a two-platform development for production of up to 245,000 barrels per day of oil with gas.

The Heimdal Field was expected to start production in 1986 at the rate of 3 billion cubic meters of gas per year.

Heimdal gas was to be pumped through the $2 billion Statpipe system together with the Statfjord gas system to Karstö and from there to Ekofisk and Emden on the mainland. The Statpipe system was on schedule; it was designed for pumping up to 20 billion cubic meters per year through two riser platforms and was to land at Karstö in Norway.

For the future, the Sleipner Field was in the planning stage, with reserves estimated at 300 billion cubic meters of gas and condensate, but carbon dioxide and other problems may delay opening of the field until after 1990.

The operator for the Oseberg Oilfield and Gasfield, operated by Norsk Hydro, in blocks 30/6 and 30/9 was near a declaration of commerciality, as was Shell's nearby Troll Field in 31/2, but the Norwegian Storting (parliament) seemed to favor first developments north of the 62d parallel, such as the Askeladden Gasfield in the Tromsöflaket block 2120/8 that could hold 150 billion cubic meters. Trommeliten, a smaller 24-billion-cubic-meter field, and the Hod Field, both near Ekofisk, were up for appraisal.

In 1982, exploration work in the North Sea resulted in many promising finds, as 49 exploration and appraisal wells were started, of which 25 had hydrocarbons, while 8 were unfinished. Of the total, 31 wells reached unexplored structures, of which 14 found hydrocarbons, for a success rate of 45%. Oseberg accounted for nine wells, and Sleipner, for eight, five wells were on Haltenbanken, and four, on the Tromsöflaket, where three showed substantial gas. The best well in 1982 was Saga Petroleum Co.'s fourth well in block 34/4, flowing at a rate of almost 2,000 tons of oil and 200,000 cubic

meters of gas per day, and this was the first time from Triassic sandstone in the North Sea.

Plenty of areas were available for drilling, but lower oil prices may dampen demand for 46 blocks to be offered soon for licensing. For the first 12 blocks on Traenabanken, located north of the 62d parallel, only 14 bids were received by the Government and several jack-up drills were idle.

In 1982, Norway had nine producing oilfields and gasfields: Ekofisk, West Ekofisk, Cod, Tor, Albuskjell, Edfisk, Edda, Statfjord, and Vallhall. Under development were the Gullfaks and Ula Fields. All of these fields were south of the 62d parallel.

[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Norwegian krone (NKr) to U.S. dollars at the rate of NKr5.80=US$1.00 for 1982.

Table 5.—Norway's supply and apparent consumption of fuels and power

(Million tons of standard coal equivalent)

	Total primary energy	Coal[1]	Crude oil petroleum product	Natural gas	Hydroelectric[2]
1981:					
Production[3]	84.6	0.3	37.4	37.3	9.6
Imports	12.3	.5	11.6	--	.2
Exports	73.9	.1	33.7	37.3	2.8
Apparent consumption	23.0	.7	15.3	--	7.0
1982:[p]					
Production[3]	89.3	.4	39.3	39.3	10.5
Imports	12.2	.7	11.3	--	.2
Exports	76.7	.1	34.4	39.3	2.9
Apparent consumption	24.8	1.0	16.2	--	7.6

[p]Preliminary.
[1]Includes peat.
[2]Includes waste energy and trade of all electric power.
[3]Primary energy only.

The Mineral Industry of Pakistan

By Suzann C. Ambrosio[1]

Pakistan's mineral industry continued to grow and contributed nearly 1% to the 1981-82,[2] $29 billion gross national product (GNP).[3] Despite encouraging growth in the industrial sector, and an approximate 6% growth in the national economy, the balance-of-payments (BOP) situation worsened. The current account deficit nearly doubled to roughly $130 million, owing in large part to diminished export revenues and an increased import bill. Mineral output of fertilizer materials, other nonmetals, iron and steel, and hydrocarbons continued to be oriented toward domestic markets and import substitution. However, petroleum product exports and gem stones comprised nearly 10% of the nation's total exports of roughly $3 billion.

Net capital inflows increased 17% over that of 1981 and the International Monetary Fund (IMF) granted the second year of the Extended Fund Facility to assist in financing the nearly doubled BOP deficit. The outstanding public debt reached approximately $13 billion by yearend 1982, equivalent to approximately 45% of GNP.

Growth in the industrial sector was led by the fertilizer industry. Output increases of 14.4% over the previous fiscal year were attributed to the startup of two new public sector plants, Pak-Arab Fertilizers Ltd. and the Hazara fertilizer complex, and the semipublic Fauji Foundation fertilizer project. Steel production grew 6%, owing largely to the increased availability of iron scrap from the growing Pakistani ship-breaking industry. Cement production increased by 3% during 1981-82, primarily from the Mustehkam cement expansion project. Oil and natural gas output have increased from 1980 levels, but consumption outpaced production growth rates. Enhanced exploration efforts and domestic oil and gas price increases were expected to relieve the supply shortages.

During 1982, power outages were reported at a variety of industrial complexes. The Government was expected to exempt export-oriented industries from the power reductions. The upward trends in mineral output were expected to continue, commensurate with increased private sector financing of mostly nonfuel mineral projects. Pakistan's private sector plan of July 3, 1982, focused on accelerating investments, especially in the infrastructure area, to accomplish the goals of the sixth 5-year development plan (1983-87).

Construction of the third phase of the Tarbela hydropower project was initiated and the two additional 175-megawatt units were expected to be commissioned by 1985. The first four Tarbela units were already producing near capacity of 700 megawatts. The Government planned to expand the power-generating capacity by 17% during 1982-83. The International Energy Development Corp. BV (Netherlands) was contracted to assess the energy needs of the country and to develop a technical, financial, and policy oriented long-term energy plan.

PRODUCTION AND TRADE

Despite increased output of barite, cement, fertilizer materials, hydrocarbons, and iron and steel, Pakistan continued to have a mineral trade deficit. The annual

rate of increase of total imports decreased from the 25% average of recent years to under 5% during 1981-82. Imports during the year reached $5.7 billion and were comprised of petroleum, 30.8%; machinery, 15%; transport equipment, 7.2%; chemicals, 5.4%; iron and steel, 4.5%; fertilizer materials, 1.5%; and other manufactured items, 35.6%. Fertilizer imports declined as the Fauji Fertilizer Co. Ltd. plant was brought up to its daily designed capacity of 1,000 tons of ammonia and 1,750 tons of urea. Cement imports of 1.5 million tons have declined slightly because of increased domestic production.

Total exports declined 17% to $2.3 billion during 1981-82 largely because of depressed world commodity prices. Petroleum products comprised approximately 9% of total exports, while nearly 90% of the nation's petroleum requirements continued to be imported from the Middle East. Expanded output of hydrocarbons, coal, fertilizers, iron and steel, cement, and other mineral products were expected to help alleviate the mineral trade deficit over the next 5-year development period.

Pakistan's commercial policies continued to emphasize export promotion and import substitution. Import liberalization policies continued, as prompted by the IMF, and reflected Government efforts to stimulate industrial investment and output. Private sector involvement in the cement, chemical, and iron and steel industries continued to grow at a slow rate and the Government has given assurances against nationalization of certain industries. The various regional mineral development corporations were seeking joint venture participation in the Saindak copper and iron mining and pellet production projects in Baluchistan, and the lignite mining and thermal power-generation project in Sind.

Pakistan's major export partners, in descending order, included Japan, 8.5%; Saudi Arabia, 7.4%; the United States, 7.2%; China, 5.9%; the United Kingdom, 5.1%; Hong Kong, 4,6%; and Iran, 3.3%. Minerals comprised a small part of the nation's exports during 1981-82.

Table 1.—Pakistan: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum: Bauxite, gross weight	1,621	1,640	1,618	2,087	2,000
Antimony ore:					
Gross weight	104	31	40	90	90
Metal content[e]	21	6	10	20	20
Chromium: Chromite, gross weight	11,000	2,638	3,115	1,427	1,500
Iron and steel:					
Pig iron[2] thousand tons	--	--	--	383	500
Mild steel products do	349	365	400	500	500
Manganese ore, gross weight	288	110	186	96	90
NONMETALS					
Abrasives, natural: Emery	887	1,133	1,395	862	870
Barite	19,194	34,200	14,054	23,929	24,000
Cement, hydraulic thousand tons	3,103	3,418	3,336	[2]3,538	3,800
Chalk	1,091	1,595	3,426	1,311	1,500
Clays:					
Bentonite	906	1,441	1,504	1,130	1,100
Fire clay	50,000	56,168	55,139	59,633	60,000
Fuller's earth	18,000	40,331	24,463	20,558	21,000
Kaolin (china clay)	13,758	15,114	27,162	38,527	40,000
Other	76,000	[e]70,000	66,000	86,000	90,000
Feldspar	14,305	14,851	10,898	10,494	10,000
Fluorspar	450	791	592	[2]819	800
Gypsum, crude	253,000	343,000	568,000	393,000	350,000
Magnesite, crude	2,672	2,748	1,525	1,551	1,600
Nitrogen: N content of ammonia	309,200	385,600	350,000	[2]445,083	450,000
Pigments, mineral, natural: Ocher	4,672	1,028	326	[2]1,889	1,000
Salt:					
Rock thousand tons	413	512	506	562	500
Marine do	227	348	369	495	450
Total do	640	860	875	1,057	950
Sand and gravel:					
Gravel	96,000	83,000	[2]26,000	[2]12,000	15,000
Sand:					
Bajri and common	20,836	18,086	46,908	60,494	50,000
Glass	69,656	91,000	94,000	82,000	75,000

See footnotes at end of table.

Table 1.—Pakistan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Sodium compounds, n.e.s.:					
Caustic soda	34,605	37,831	39,181	38,963	40,000
Soda ash, manufactured	74,019	75,258	87,911	101,158	100,000
Stone:					
Aragonite and marble	39,000	102,000	114,000	100,000	95,000
Dolomite	11,426	13,904	21,062	32,284	30,000
Limestone thousand tons	2,887	3,297	2,984	3,192	3,000
Crushed do	172	1,445	1,500	799	800
Strontium minerals: Celestite	217	[r]678	250	288	300
Sulfur:					
Native	1,083	729	800	480	500
Byproduct, all sources[e]	14,000	14,000	14,000	14,000	4,500
Total	15,083	14,729	14,800	14,480	5,000
Talc and related materials: Soapstone	25,290	27,200	30,000	24,997	25,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades thousand tons	1,036	1,329	1,695	1,524	1,500
Gas, natural (sales) million cubic feet	195,784	240,033	287,213	316,360	300,000
Natural gas liquids[e] thousand 42-gallon barrels	36	38	40	40	40
Petroleum and refinery products:					
Crude do	3,491	3,823	3,629	3,474	4,000
Refinery products:					
Gasoline do	3,735	4,015	3,650	[e]4,000	4,000
Jet fuel do	3,893	4,015	4,380	[e]4,500	4,500
Kerosine do	1,749	1,460	1,460	[e]1,700	1,700
Distillate fuel oil do	7,619	8,030	8,395	[e]9,000	9,000
Residual fuel oil do	7,734	8,030	9,490	[e]8,000	9,000
Lubricants do	616	365	730	[e]600	800
Other do	9,392	2,190	2,555	[e]6,200	5,000
Refinery fuel and losses do	2,000	2,190	2,555	[e]3,000	3,000
Total do	36,738	30,295	33,215	[e]37,000	37,000

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through May 27, 1983.

[2]Reported data represented production during the fiscal year, July 1 through June 30.

Table 2.—Pakistan: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Iron and steel: Metal:				
Scrap	72	210	--	All to Japan.
Semimanufactures: Bars, rods, angles, shapes, sections	1,042	--		
Lead: Ore and concentrate	100	--		
Manganese: Ore and concentrate	1,000	--		
Silver: Ore and concentrate[1]				
value, thousands	--	$37	--	All to West Germany.
Tin: Ore and concentrate	1	--		
Other: Oxides and hydroxides	--	1,381	--	Republic of Korea 1,200; United Arab Emirates 180.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	46	10	--	Bangladesh 5; United Kingdom 4.
Clays and clay products:				
Crude, unspecified	118	424	--	Bangladesh 282; United Arab Emirates 122.
Products:				
Nonrefractory	13	(2)	--	All to Kenya.
Refractory including nonclay brick	264	2	--	All to Iran.

See footnotes at end of table.

Table 2.—Pakistan: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, unspecified	76,929	94,703	--	United Arab Emirates 90,504; France 1,433; United Kingdom 1,074.
Manufactured:				
Nitrogenous	--	2,971	--	Czechoslovakia 2,842; Hungary 129.
Phosphatic	300	216	--	All to Iran.
Phosphates, crude	110	59	--	All to United Kingdom.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1,581	--		
Synthetic do.	$73	--		
Salt and brine	24,851	6,679	--	India 4,005; Afghanistan 1,591; Kuwait 1,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	11,598	17,989	127	Italy 14,437; Greece 539.
Worked value, thousands	$3,129	$3,270	$402	Japan $709; Czechoslovakia $472; Italy $289.
Gravel and crushed rock	2,831	647	--	Sri Lanka 205; Bangladesh 194; Singapore 150.
Limestone other than dimension	227	164	--	Bangladesh 109; United Arab Emirates 54.
Sand other than metal-bearing	--	140	--	All to United Arab Emirates.
Other: Crude	4,158	477	--	Japan 200; Kuwait 156; Afghanistan 83.
MINERAL FUELS AND RELATED MATERIALS				
Coal, all grades excluding briquets	184	(3)	--	All to France.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	1,316	395	--	India 263; People's Democratic Republic of Yemen 132.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	545	603	--	All to Afghanistan.
Gasoline do.	--	425	--	All to Iran.
Residual fuel oil thousand 42-gallon barrels	5,155	6,767	--	India 2,478; Peoples's Democratic Republic of Yemen 1,279; Australia 866.

[1]May contain platinum-group metals.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $29,000.

Table 3.—Pakistan: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	3	--	All from Morocco.
Metal including alloys:				
Unwrought	2,084	2,687	817	West Germany 564; United Kingdom 538; Egypt 199.
Semimanufactures	8,788	8,429	1,923	Canada 2,319; Argentina 699; Switzerland 677.
Copper:				
Ore and concentrate	55	59	--	Australia 49; Switzerland 10.
Metal including alloys:				
Unwrought	384	178	--	Belgium-Luxembourg 100; United Arab Emirates 36.
Semimanufactures	5,535	6,670	27	Japan 2,020; Canada 1,206; West Germany 902.
Iron and steel:				
Iron ore and concentrate:				
Pyrite, roasted value, thousands	--	$8	--	All from Hong Kong.
Unspecified	33,794	312,980	33,000	Australia 78,017; Liberia 72,500; Canada 54,705.

Table 3.—Pakistan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Scrap	333,841	484,612	105,470	United Kingdom 73,345; West Germany 63,611; United Arab Emirates 61,526.
Pig iron, cast iron, related materials	43,404	19,031	--	China 18,936; Japan 34.
Ferroalloys:				
Ferromanganese	2,883	50,591	--	China 48,383; Norway 894; Japan 668.
Unspecified	17,438	4,059	63	China 2,058; Norway 1,330.
Steel, primary forms	125,079	159,086	10,862	Japan 31,878; China 25,440; Belgium-Luxembourg 21,211.
Semimanufactures:				
Bars, rods, angles, shapes, sections	32,282	114,369	110	Hungary 29,096; China 21,303; Czechoslovakia 19,127.
Universals, plates, sheets	333,032	467,218	77,014	West Germany 149,298; Japan 67,759; Australia 29,639.
Hoop and strip	4,328	4,890	24	Japan 3,779; China 327.
Rails and accessories	9,414	17,515	--	United Kingdom 16,906; Japan 276.
Wire	11,447	10,820	112	China 3,742; Japan 3,049; Republic of Korea 916.
Tubes, pipes, fittings	37,896	41,152	1,299	West Germany 14,608; Japan 14,482; China 2,467.
Castings and forgings, rough	1,116	1,890	21	Japan 1,004; Italy 250; United Kingdom 192.
Lead:				
Ore and concentrate	300	232	--	Morocco 200; Senegal 19.
Metal including alloys:				
Unwrought	2,175	2,082	--	Canada 1,169; United Kingdom 367; Australia 167.
Semimanufactures	5	59	--	United Kingdom 57; Japan 2.
Manganese: Ore and concentrate	150	214	--	China 204; Singapore 10.
Nickel:				
Ore and concentrate	1,782	386	--	Netherlands 352; United Kingdom 22; Canada 12.
Metal including alloys:				
Unwrought	52	46	2	Canada 18; United Kingdom 15.
Semimanufactures	128	146	1	United Kingdom 78; Canada 40; West Germany 13.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	--	$41	--	All from West Germany.
Tin: Metal including alloys:				
Unwrought	150	174	--	Belgium-Luxembourg 140; Malaysia 19; China 15.
Semimanufactures	17	21	19	Malaysia 1.
Uranium and/or thorium: Ore and concentrate value, thousands	--	$15	--	All from Morocco.
Zinc:				
Ore and concentrate do	$30	--		
Metal including alloys:				
Unwrought	9,749	11,201	431	Japan 3,183; Spain 1,874; Republic of Korea 1,628.
Semimanufactures	173	228	4	Belgium-Luxembourg 167; West Germany 23.
Other:				
Ores and concentrates	16,097	581	24	United Arab Emirates 157; West Germany 114; United Kingdom 96.
Oxides and hydroxides	6,213	6,646	43	China 2,509; West Germany 1,650; United Kingdom 509.
Metals including alloys:				
Scrap	58,164	44,316	459	Kuwait 23,166; Singapore 5,769; Sri Lanka 4,280.
Unwrought and semimanufactures	(1)	150	(2)	China 39; Hong Kong 22; Japan 21.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$351	$437	$104	Netherlands $293; West Germany $18.
Grinding and polishing wheels and stones	520	602	(2)	China 203; West Germany 138; Poland 85.
Asbestos, crude	3,564	17,579	--	United Kingdom 8,696; Canada 6,335; Republic of South Africa 1,636.
Cement thousand tons	436	1,527	(2)	Republic of Korea 897; Bulgaria 194; Romania 106.

See footnotes at end of table.

Table 3.—Pakistan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude, unspecified	22,613	82,256	25,372	West Germany 30,729; United Kingdom 15,434; China 7,863.
Products:				
Nonrefractory	2,056	807	22	West Germany 277; China 244; United Kingdom 109.
Refractory including nonclay brick	8,227	7,800	7	West Germany 2,082; Austria 1,508; France 873.
Diamond:				
Gem, not set or strung value, thousands	--	$23	$3	Canada $20.
Industrial do	$2	--		
Fertilizer materials:				
Crude, unspecified	2	--		
Manufactured:				
Nitrogenous	945,215	368,144	--	Yugoslavia 67,399; Netherlands 49,000; Saudi Arabia 44,640.
Phosphatic	506,120	--		
Potassic	5,000	15,500	--	All from West Germany.
Unspecified and mixed	252	191,889	59,626	Netherlands 76,560; Austria 22,265; Norway 14,000.
Mica: Worked including agglomerated splittings	2	2	--	Japan 1.
Phosphates, crude	135,964	172,099	--	Jordan 149,957; Japan 12,097; Morocco 10,000.
Potassium salts, crude	--	3	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	--	$7	$7	
Synthetic do	$9	$4	--	Austria $3; Japan $1.
Pyrite, unroasted	--	8	--	All from United Kingdom.
Salt and brine value, thousands	$2	$19	$11	Belgium-Luxembourg $5; West Germany $3.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	17	1,024	--	India 1,000; Republic of Korea 18.
Worked	71	2,383	--	Singapore 779; Japan 680; United Kingdom 680.
Gravel and crushed rock	--	8	--	All from United Kingdom.
Limestone other than dimension	--	55	31	Japan 22.
Sand other than metal-bearing	--	114	2	Belgium-Luxembourg 66; West Germany 20.
Sulfur: Elemental, crude including native and byproduct	22,443	28,260	131	Kuwait 21,635; Qatar 6,000.
Other:				
Crude	[3]75	8,649	98	Belgium-Luxembourg 4,540; Ireland 1,100; China 872.
Slag and dross, not metal-bearing	--	20	--	All from Netherlands.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	3,766	43	18	Spain 14; Japan 9.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	165	27	20	United Kingdom 7.
Coal: All grades including briquets	92,628	[4]120,329	26,634	Australia 61,467; Argentina 32,105.
Coke and semicoke	249,222	--		
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	37,543	32,017	--	Saudi Arabia 23,079; United Arab Emirates 8,938.
Refinery products:				
Gasoline do	908	792	1	Bahrain 557; Kuwait 169; Italy 38.
Mineral jelly and wax do	374	307	1	China 272; West Germany 19.
Kerosine and jet fuel do	3,672	1,985	(2)	Kuwait 1,423; Bahrain 551.
Distillate fuel oil do	7,871	4,640	(2)	Kuwait 3,702; Bahrain 837.
Lubricants do	256	237	21	United Kingdom 80; West Germany 41; Italy 39.
Residual fuel oil do	43	3	1	United Kingdom 1.
Bitumen and other residues do	3	2	(2)	Italy 1.
Tars and other crude chemicals derived from coal, gas, and petroleum	429	2,293	--	United Kingdom 1,327; France 718; China 238.

[1]Unreported quantity valued at $225,000.
[2]Less than 1/2 unit.
[3]Total excludes unreported quantity valued at $2,085,000.
[4]Excludes unreported quantity of lignite and lignite briquets valued at $304,000.

COMMODITY REVIEW

METALS

Bauxite.—Development of approximately 70 million tons of bauxite resources was deferred and made part of the nation's sixth 5-year plan efforts.

Chromite.—Output from about 350 small chromite prospects and mines, located just south of Muslimbagh, was increased during 1982. Nearly all of the small workings recovered metallurgical-grade ores averaging 49.5% Cr_2O_3, 9.5% Al_2O_3, 16.2% MgO, 3.5% SiO_2, and 14.5% FeO. Lower grade ores averaging 30% Cr_2O_3 and vein-like ore deposits with high Al_2O_3 content were generally left behind or occasionally blended with other ores.[4] This was largely a result of the difficult mining conditions and a lack of domestic market demands. The Baluchistan Development Authority (BDA) reportedly increased production capacities of the Muslimbagh chrome mines and set a 10,000-ton production target for 1982.

Copper.—The Saindak integrated copper project in western Baluchistan, sponsored by the Government Resource Development Corp., was considering a joint venture proposal submitted by a consortium of Canadian, French, and Yugoslav companies, called Saindak Joint Venture (SJV). Initial discussions were for a Government-SJV equity split of 75% and 25%, respectively, for the estimated $400 million project. SJV was expected to provide the total $234 million foreign exchange component and the local currency component of $165 million was expected to be provided by Pakistani financial institutions. Recoverable quantities of the three Saindak ore bodies were reestimated at 1.69 million tons of copper, 2.24 million ounces of gold, 2.49 million ounces of silver, and 20,374 tons of molybdenum. Plans were made initially to establish a concentrator at the minesite and develop facilities to transport the copper, pyrite, magnetite, and molybdenite concentrates to the smelter, steel billet, and sulfuric acid plants.

A final report was expected to be submitted to the Bankers Equity Ltd. (Pakistan) by yearend 1982. Romania offered an approximate $6 million worth of suppliers credit for the smelter, roaster, acid, and slag flotation plants. Yugoslavia offered $8 million worth of financial and technical assistance for the Saindak project. The Canadian Government had offered and agreed to finance an approximate $8 million engineering requirements study to be completed by yearend 1983. France, the Federal Republic of Germany, Norway, and the United Kingdom offered suppliers credits totaling approximately $30 million.

Iron Ore.—The Pakistan Council of Scientific and Industrial Research (PCSIR) continued to investigate iron ore deposits, primarily in Baluchistan. High-grade concentrates were produced by PCSIR from a pilot plant that was testing Pachinkoh and Chigendik iron ores. Pelletizing and reduction tests on the concentrates were expected to be completed by yearend.

Iron and Steel.—The 800-millimeter billet mill was commissioned at the Pipri steelworks near Karachi, and the second coke oven battery and blast furnace were ready for commissioning by December 1982. Trial commissioning of one of the converters and the bloom caster took place during the same month. The second converter, two slab casters, and the hot-strip mills were expected to be commissioned by yearend 1983. Completion of the steel complex was scheduled for August 1984, after the commissioning of the cold-rolling mills. When operational, the steel complex was projected to employ 15,000 people. The annual output target of 1.1 million tons of steel, 250,000 tons of coke, and 135,000 tons of pig iron was expected to be reached during 1985. During 1982, Pakistan imported 2 million tons of iron ore, 1.3 million tons of coking coal, and 50,000 tons of manganese ore to feed the steel mills. The excess pig iron and coke was exported primarily to India and Romania, respectively. Domestic sources were expected to annually provide 430,000 tons of dolomite, 4,000 tons of fluorite, and 44,000 tons of refractory clay for the steelworks.

The Soviet Union has provided a loan worth approximately $500 million, repayable in 12 years, to assist in financing the project. Approximately $1.7 billion has already been spent on the project, an equivalent of nearly 70% of the total projected cost. In addition, the Soviet Union was expected to supply equipment for a hot-strip mill and a cold-rolling mill sometime during 1983. Pakistani engineers and technicians were expected to replace the Soviet technical team after the completed steelworks have undergone trial commissioning. Soviet assistance was also being considered for the establishment of a metallurgical institute

and hydroelectric power station in Pakistan.

Increased small-scale private participation in the iron and steel industry was exemplified by the establishment of a mini-steelworks to make wire rod and a foundry to manufacture galvanized iron pipe fittings. The first project was being planned by the Chaudhri Group Ltd. with annual output projected initially at 20,000 tons of 5.5- to 12.5-millimeter rods and 14- to 32-millimeter bars, and eventually increasing to 40,000 tons.

The foundry project, established by the Habib Group Ltd., envisioned a design capacity of approximately 7,400 tons of castings with a projected startup date of 1983. Outside of these examples of small-scale private sector involvement, larger scale production of steel remained under Government control. The proposal to sell off the specialty steelmaker, Pakistani People's Steel Mills, to Japanese investors was rejected by the Government. In general, however, downstream projects involving both foreign and local investors have the option to establish their own plants or enter into joint venture arrangements with the Government-owned Pakistan Steel Mills. Two projects involving the production of slag blocks and large-diameter pipes were sanctioned by the Government during 1982.

NONMETALS

Barite.—Bolan Mining Enterprises, a joint venture between the BDA and Pakistan Petroleum Ltd. (PPL) continued to be the largest barite producer. The plant, located at Khazdan, was rated at 24,000 tons annually. BDA was also considering developing a barite mine and grinding plant at Dham Jhal to produce an additional 50,000 tons per year. The Government approved the construction of another grinding plant at Lasbela during the year.

Cement.—Cement output continued to rise, largely because of the 300,000-ton expansion of the Mustehkam cement plant, increased domestic cement prices, and increased duties on imported cement. Three projects commissioned during 1982 had the effect of raising annual cement capacity from approximately 3.7 million tons to 4.3 million tons. In addition to the Mustehkam expansion, there was an expansion of the Javedan plant and a new factory was constructed at Thatta. Other new facilities located at Dandot and at Kohat were expected to be completed by yearend 1983 and expansion of the Dandkhel factory was projected for 1985.

The State Cement Corp. commissioned the new $49 million Thatta plant during August 1982. Limestone originating from Makli Hills in the Thatta district and slag from the Pakistan mills were used to produce 300,000 tons of grey cement and 30,000 tons of slag cement. Two other Government projects at Dandot and Kohat were expected to increase annual capacity by another 300,000 tons.

Five cement facilities, including Asbestos, Gharibiwal, Javedan, Mustehkam, and Zeal Pak, accounted for nearly 70% of the nation's output. The average capacity utilization rate for these plants was 80% during 1982.

New cement projects under consideration at yearend 1982 included a new $71 million plant at Hub with a 2,000-ton-per-day capacity, a slag-based cement plant at Karachi with a 1,000-ton-per-day capacity, and a new factory at Hub-Chowki with a 2,000-ton-per-day capacity. All of these projects were expected to be majority owned and operated by private firms. Despite enhanced output at domestic facilities, Pakistan continued to import approximately 5 million tons of cement during 1981-82. Demand was projected to level off to roughly 6 million tons during 1983.

China Clay.—The Government completed investigations of the Nagar Parker kaolin deposits and planned to establish an elutriation plant near the deposit sites within the Sind Province.

Fertilizer Materials.—The 61,000-ton-per-year Hazara Urea Fertilizer Plant, renamed the Pak-China Fertilizer Plant, was commissioned during October 1982. The Fauji Fertilizer Plant at Goth Machhi was commissioned during June 1982 with annual capacities to produce 272,000 tons of ammonia and 262,000 tons of urea. Fauji Fertilizer made an application to the Government-owned National Fertilizer Corp. to construct and operate an 800- to 1,000-ton-per-day diammonium phosphate plant. All of the nation's diammonium phosphate requirements of approximately 360,000 tons were imported during 1981-82. The only existing nitrophosphate facility was located at the Multan plant, and the annual rated capacity of 70,000 tons met approximately 30% of the nation's requirements.

Fertilizer rehabilitation projects estimated to cost nearly $50 million were underway in 1982. The Multan nitrogen plants were undergoing reconditioning and the ammonia capacity was expected to be increased by

the installation of a purge gas recovery unit. Similarly, the ammonium sulfate plant at Daud Khel was expected to receive a new boiler, a new water treatment plant, and a converter renewal at the sulfuric acid plant. The Government projected that by 1986 domestic fertilizer consumption would rise to 1.8 million tons and imports would comprise approximately 40% of that requirement.

The International Bank for Reconstruction and Development (World Bank) extended a $38.5 million, 20-year loan to finance a macroeconomic study of Pakistan's fertilizer demands. The study was also expected to include the development of a strategy for expansion and an analysis of the Government's fertilizer pricing policies.

Gem Stones.—The Pakistan Investment Promotion Bureau approved a gem stone cutting, processing, and polishing industry for the city of Karachi. Swedish and Belgian entrepreneurs were expected to provide technical and financial assistance for the $2 million project. The gem stones to be processed included Hunza rubies, Swat emeralds, Skarou assorted gem stones, and internationally marketed diamonds. Implementation of the project may be delayed because of the Gemstone Corp. of Pakistan's severe liquidity problem. Feasibility studies of the Swat emerald mines, Charbagh-Alpurai district emerald deposits, Dassu aquamarine and beryl deposits, and Katlang-Mardan district topaz deposits were delayed because of the lack of capital. By yearend 1982, three new emerald deposits had been discovered by Gemstone at Charbagh, Makad, and Gujar Killi in Swat, Pakistan. The Gujar Killi emerald deposits were expected to be one of the first to be developed using open pit mining methods.

Graphite.—Punjab Mineral Development Corp. (PMDC) reported newly discovered graphite deposits in Azad, Jammu, and Kashmir, near the Baluchistan and North-West Frontier Province boundaries. Some of the samples tested were found to be 95% pure and initial resources were estimated at 1.5 million tons.

Gypsum.—Progress was made in the development of Pakistan's 350 million tons of gypsum reserves. A new plant, financed by the private sector, was to be established at Burikhel in the Mian Wali district of Punjab. The plant's planned annual production capacity of 100,000 tons was to be fed by the newly developed quarry. In addition, PMDC was planning to expand mining and processing facilities to produce 500,000 tons of gypsum annually at Daudkhel. The Asian Development Bank offered to finance $30 million, contingent upon a feasibility study being prepared by Kaiser Engineering Co.

Salt.—PMDC completed geological feasibility studies for solution mining rock salt near the Khewra salt mines. New mines with an annual production capacity of 300,000 tons were planned and envisioned for domestic manufacturing of soda ash and table salt.

MINERAL FUELS

Coal.—Efforts continued to be made to explore and develop the country's extensive coal deposits, despite the generally low energy value and high sulfur and ash content. To date, the most viable deposits were located at Sharigh in Baluchistan, and at Thatta and Lakhra in the Sind Province. The Lakhra Coalfields were estimated to contain nearly one-half of the nation's total resources of approximately 500 million tons. The Geological Survey of Pakistan (GSP) was investigating other areas within Pakistan including the higher quality Gonwana coal deposits, located within the Punjab Province.

GSP in conjunction with the U.S. Agency for International Development (AID) and the U.S. Geological Survey were assessing the Lakhra Coalfields and other deposits located in Baluchistan during 1981-82. The coal studies were part of a larger AID-sponsored conventional energy resources assessment program with other main components including sedimentary mineral resources assessment, sedimentary basin analysis, and geothermal and geological hazard studies.

The Survey and AID personnel visited the Thatta and Lakhra Coalfields during 1982 to (1) assess the status of coal resource studies in Pakistan and, (2) determine requirements of coal geochemistry and coal petrology laboratories. Reviews were made of the Pakistani Water and Power Development Authority (WAPDA) proposal to construct a thermal powerplant in the Hyderabad area based on Lakhra coal resources. Preliminary results have indicated the viability of Lakhra coal as an alternative to more expensive imported coal or domestic oil and gas for thermal power generation.

Negotiations for a $7 million International Development Association of the World Bank loan were underway. The coal engineering project to be implemented by WAPDA was expected to focus on geological surveys and feasibility studies of the Duki

area, Baluchistan.

GSP and PMDC approved a coal exploration and Sharigh expansion program for the Baluchistan region. Mining has already occurred in the Sore Range, Digari, and Sharigh Coalfields, where an estimated 83 million tons of resources exist. Additional resources were being explored by PMDC in the Degari Coalfields of the Kalat district. PMDC planned to expand output of the Sharigh cokemaking facilities. A feasibility study recommended a $2 million coal-washing plant to produce 75,000 tons of coking coal for the ultimate manufacture of metallurgical-grade coke.

Natural Gas.—The balance of Pakistan's natural gas reserves stood at 15.9 trillion cubic feet in June 1982. The three commercially exploited gasfields, Sui, Mari, and Sari Hundi, contained 38%, 24%, and 0.3%, respectively, of the remaining reserves. Other sources of natural gas included associated gas, recovered from the Meyal and Toot Oilfields.

By yearend 1982, 34 producing wells had an average output of approximately 700 million cubic feet per day. Domestic demand for natural gas was estimated at 935 million cubic feet per day during 1982, according to the Ministry of Petroleum and Natural Resources 10-year (1981-90) gas plan. The consumption growth rate for natural gas was approximately 11% over the decade. Natural gas sales were divided among industrial, 84%; domestic, 12%; and commercial users, 4%; with 40% of the industrial sector's consumption utilized in thermal power generation.

Output from the Sui Gasfields were fed into the grids of the Sui Gas Transmission Co. Ltd. (SGTC), Sui Northern Gas Pipelines Ltd., and the Gudu Thermal Power Station. Sui reserves were estimated to last another 20 years at the current production rate of approximately 850 million cubic feet per day. An investment of $33 million over the next 10 years was projected for the introduction of compressors to maintain production of the Sui wells. PPL, with assistance from Burmah Oil Public Ltd. Co., completed the conceptual design study for the wellhead gas compression facilities. The first of the four-phase compressor installation was projected to cost $14.5 million. A loan agreement for the project was signed between PPL and the International Finance Corp. on December 30, 1982.

The Pirkoh Gasfield with an estimated 1 to 5 trillion cubic feet of reserves was being developed to supply 72 million cubic feet per day to the SGTC. The Oil and Gas Development Corp. (OGDC), planned to bring the field into maximum production of roughly 120 million cubic feet per day in three phases over a 4-year period. Development has been delayed because of the lack of technical and financial assistance.

A $30 million loan agreement for the first phase was being negotiated with the Asian Development Bank to cover the costs of drilling the first three Pirkoh wells. The first phase of development included drilling six wells, installing two gas dehydration plants, associated gathering facilities, and infrastructure. Tenders for the production materials and consultant services were expected to open in April 1983, and the completion of the first phase was targeted for yearend 1983.

The Mari Gasfield was expected to reach its optimum production level of 387 million cubic feet per day by 1986. The gas would feed WAPDA's new 300-megawatt gas turbine at Gudu. The Kandhkot Gasfield was expected to be developed by 1986, and was also slated for Gadu thermal power generation. Initial investigations of the Dhodak Gasfield revealed that the condensate gas was not likely to be available before 1990. Initial development would require gas reinjection to maintain pressure over several years.

The Southern Transmission System, operated by SGTC and serving the Sind and Baluchistan Provinces, was estimated to be capable of supplying a maximum of 255 million cubic feet per day of purified Sui and Sari Hundi gas for distribution by the Indus Gas Co. and the Karachi Gas Co. Ltd. SGTC approved three gas pipeline projects for completion by December 1983. The 217-mile, 12-inch line from Shikarpur to Quetta began construction during 1982. Construction of the 46-mile, 18-inch line linking the new Pirkoh Gasfield with the Sui Gasfield, and a 34-mile, 14-inch line linking the Lasbela Spur to Bawani in the Lasbela district, was expected to begin during 1983.

Petroleum.—Pakistan produced only 12% of the nation's oil requirements of approximately 100,000 barrels per day and imported the balance from Saudi Arabia, Iraq, and other gulf states. The Petroleum Ministry fell short of their projected 50% increase in output to roughly 16,000 barrels per day during fiscal year 1982. The expected increase was attributed to the recent discovery and exploitation of the Khaskheli

Oilfield, which was producing only 2,600 barrels per day from June through December 1982. The Meyal and Toot Oilfields continued to produce the largest quantities of crude, accounting for nearly 83% of the output. Total production targets were set at 30,000 barrels per day by 1990, in part to accommodate the 5% projected consumption growth rate of petroleum products over the next 10 years.

Khaskheli output began in 1982, and although the crude was transported by trucks, the wellhead pressure was kept below normal. Connecting the field via pipeline to the Karachi refinery was being considered to realize a 6,000-barrel-per-day output level. The second development of the phase of the Toot Oilfield was projected to commence early in 1983 with the inauguration of well No. 16. The recently developed Adhi fields output doubled to approximately 330 barrels per day during fiscal year 1980-81. By December 1982, Adhi well No. 9 was spudded. Drilling activities were expected to continue at Adhi No. 9, a joint venture between OGDC and the operators, PPL. The crude was transported by tankers to the Attock Refinery.

OGDC opened eight onshore blocks to oil exploration bids. The offer included a 2.5% coverage of exploration venture costs and a 50% equity split in any developable finds. Seismic survey results and other technical data were available for $5,000, and the bidding was closed on December 30, 1982. Joint venture proposals were being considered with OGDC retaining the right to increase its participating interest to 50%. OGDC and a Kuwait delegation were negotiating joint exploration in the Bannu, Loralai, and Sukkur districts of central and northwestern Pakistan.

The World Bank granted a 20-year, $12 million loan for the first stage design and basic engineering work for a hydrocracker project and an energy audit and conservation program. The entire cost of the Karachi hydrocracker project was estimated at $350 million.

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[1]Physical scientist, Division of Foreign Data.

[2]Pakistan's fiscal year runs from July 1 through June 30. Textual material reported in fiscal years unless otherwise specified.

[3]Where necessary, values have been converted from Pakistani rupees (PRs) to U.S. dollars at the rate of PRs9.90=US$1.00 for 1981 and PRs12.20=US$1.00 for 1982.

[4]Klan, W. The Size, Shape and Parameters of Podiform Chromite Deposits, Using the Chromite Mining District of Muslimbagh, Pakistan as an Example. Federal Institute for Geosciences and Natural Resources (Hannover, Federal Republic of Germany), v. 15, 1982, pp. 82-93.

The Mineral Industry of Peru

By Doris M. Hyde[1]

In 1982, Peru faced severe financial pressures, which, to some extent, were directly attributable to depressed economies worldwide. Demand for Peru's traditional metal exports declined, and already low 1981 market prices progressively worsened throughout the year. An exception was the precious metals prices that began to recover at the end of June, but still averaged for the year well below the average for 1981.

As export earnings continued to decline, the Government was faced with current account deficits, declining foreign reserves, and a continuation of 1981's unprecedented 73% rate of inflation. In 1982, the gross domestic product (GDP) at current prices declined 1% to less than $20 billion.[2] Real growth was less than 1% as a result of declines in the mining and manufacturing sectors. In real terms, the minerals sector contributed slightly more than 9% to the GDP, only a fraction more than that of 1981.

Both the public and private sectors increased foreign borrowing to cope with fiscal deficits, and by the end of 1982, Peru's total external debt had surpassed $11 billion, a 16% increase over the 1981 level. The public sector's share of this foreign debt was about $7 billion, or 36% of the GDP. Debt service as a percentage of export earnings was 44%.

The minerals sector accounted for an estimated 63% of the total value of exports, and of this share, 41% was from the nonfuel minerals. The petroleum sector failed to meet earlier production expectations. Prices for petroleum exports also slumped as large world producers competed for sales in a declining market.

Almost all Peruvian mining companies adopted austerity programs to reduce anticipated losses for 1982. Southern Peru Copper Corp. (SPCC), the largest copper producer, canceled or delayed plans to expand production at its Toquepala and Cuajone Mines. Modifications to the Ilo copper smelter were also postponed.

Empresa Minera del Centro del Perú (CENTROMÍN PERÚ) planned to concentrate its limited 1983 investment funds on the most advanced projects. The Tintaya copper project had been totally financed and was not to be affected by austerity measures. The Toromocho copper project was a casualty of budget considerations and has been temporarily shelved.

The Government determined that 46 state-owned companies could be transferred to the private sector. Nine of these were mineral related. They included three affiliated with CENTROMÍN PERÚ: Consultores Minero Metalúrgicos S.A., Cía. Minera Los Montes S.A., and Reactivos Nacionales S.A. Another three were subsidiaries of Empresa Minera de Hierro del Perú (HIERRO PERÚ): Propiedad Minas Justa S.A., Servicios Transmar S.A., and Agencia Portuaria San Juan S.A. The last three companies were Compañía Minera San Juan de Lucanas S.A., a Banco Minero del Perú affiliate; Compañía Minera Condestable S.A., an Empresa Minera del Perú (MINERO PERÚ) subsidiary; and Minas Aguila S.A., 40% owned by Corporación Financiera de Desarrollo (COFIDE).

There were 54 separate labor strikes in the mining sector during 1982, practically the same as in 1981; however, the number of worker-hours lost decreased by 41% because of the reduced number of miners involved. SPCC suffered the greatest economic loss from 15 days of strike activity at the Toquepala Mine and Ilo smelter. HIER-

RO PERÚ endured a 39-day strike.

Government Policies and Programs.—The medium and small mining sectors were least able to cope with the continuation of 1981's depressed international metal prices. In an effort to help, the Government initiated several assistance programs designed to provide these companies with enough working capital to prevent closures.

An executive decree issued on January 2 established a $40 million Miners Compensation Fund at the Banco Minero. The purpose of the fund was to allow medium- and small-sized producers of copper, lead, silver, tin, tungsten, and zinc to obtain loans up to 20% of the value of their metal sales retroactive to July 1, 1981, whenever the f.o.b. value fell below a specified amount for each metal. The triggering prices were: $0.95 per pound for copper (London Metal Exchange wirebar); $10.50 per troy ounce for silver (Handy and Harman); $0.40 per pound for both lead and zinc (London Metal Exchange, daily average of four prices); $165 per ton for tungsten (London Metal Exchange, ore); and $5 per pound for tin. The loans had an initial 18-month grace period with the interest rate to vary by particular mineral product, after which repayment extended over 4 years at the prevailing interest rate. Each loan also carried an annual 2% commission to be used as a reserve for the fund. A loan could not be used to pay existing company loan debts. In April, the fund was authorized an additional $50 million in capitalization. The Banco Minero was to receive fund monies from the Banco de la Nación.

In July, the Government decided that more immediate relief was imperative and declared the small- and medium-sized mining operations to be in a state of emergency. Several decrees were issued to provide assistance during the remainder of the year. The Mining Compensation Fund was augmented by $120 million, with company loan amounts increased from 20% of metal sales to 50%. For 6 months the companies were exempted from payroll taxes, export taxes, and the special sales tax. For the first time, the importation of used mining equipment was allowed if purchased for the improvement of production capacity. A 6-month freeze was declared on company reductions in their labor forces. Worker salary and wage levels were also frozen, except for adjustments authorized by the Government. Although the Banco Minero failed to receive the entire amount authorized by the funding, it did receive $180 million. During 1982, the bank approved fund loans totaling almost $97 million, of which about 39% went to the small mining sector and the remainder to the medium sector.

The Banco Minero installed five more small concentrators throughout the country in continuation of its program to assist the small mining sector. The first concentrator in this 20-plant assistance project was placed in operation in 1981. The remaining plants were expected to be installed in the near future. The total cost of the 20 concentrators was estimated at over $12 million. The bank also rented MINERO PERÚ's 150-ton-per-day Michiquillay pilot plant in the Cajamarca area and began preparations to make it operative.

PRODUCTION

Preliminary figures from the Ministry of Energy and Mines indicated that the production of Peru's major metallic minerals, except iron ore, increased in relation to newly revised 1981 production figures. Because of low market prices, producers attempted to operate at optimum levels to maintain cash flow, meet financial commitments, and reduce unit costs.

In response to the midyear recovery of precious metal prices, producers increased their total silver production by 14%. The decrease in gold output was generally regarded as an exaggeration because of an apparent increase in smuggling and hoarding by placer operators.

Austerity measures curtailed most new development projects and not even the large companies were expected to show significant production increases in 1983. Although many projects have been postponed, a continuation of the apparent recovery in precious metal prices may be used to compensate for losses from associated metals.

In 1982, petroleum production increased by about 1% over that of 1981, much less than envisioned early in the year. The jungle area contributed 64% to total crude oil production, while the northern coastal area accounted for 22%, and the offshore area 14%. Unfortunately, declining petroleum prices forced both the state-owned Petróleos del Perú (PETROPERÚ) and private companies to be selective in their 1983 exploration budgets.

Table 1.—Peru: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Antimony:					
Mine output, metal content	745	546	344	685	[2]354
Metal	489	477	427	448	20
Arsenic, white[3]	[r]1,322	[r]1,415	2,475	2,164	[2]1,663
Bismuth:					
Mine output, metal content	611	527	497	639	[2]613
Metal	611	527	497	639	[2]604
Cadmium:					
Mine output, metal content	514	424	490	511	600
Metal	169	190	172	307	[2]421
Copper:					
Mine output, metal content	366,753	390,720	366,800	342,058	[2]369,425
Copper sulfate (Cu content)	1,228	1,395	4,665	5,595	5,945
Metal:					
Smelter[4]	[r]323,024	[r]372,767	356,362	312,693	[2]327,944
Refined[4]	[r]185,081	[r]229,825	229,014	208,938	[2]227,948
Gold:					
Mine output, metal content—troy ounces	112,656	124,434	133,586	176,057	[2]157,667
Metal—do	48,258	56,858	57,196	55,781	[2]69,606
Indium—kilograms	3,302	3,484	3,675	3,489	[2]3,673
Iron and steel:					
Iron ore and concentrate:					
Gross weight—thousand tons	4,921	5,444	5,705	6,069	[2]5,774
Iron content—do	3,199	3,622	3,765	4,007	[2]3,811
Metal:					
Pig iron[5]—do	244	[r]257	262	181	[2]162
Ferroalloys	[r]1,518	[r]1,498	575	30	500
Steel ingots and castings, thousand tons	374	436	447	364	[2]274
Lead:					
Mine output, metal content	182,704	174,000	176,955	192,667	211,850
Metal	74,269	85,706	79,939	79,236	76,990
Molybdenum, mine output, metal content	[r]730	1,196	2,688	2,488	[2]2,917
Selenium metal, refined—kilograms	12,927	18,320	22,908	22,478	[2]20,851
Silver:					
Mine output, metal content, thousand troy ounces	37,022	39,248	42,989	46,940	[2]53,639
Metal—do	20,897	25,488	23,797	23,853	[2]24,704
Tellurium metal—kilograms	15,417	21,233	20,920	21,310	[2]20,726
Tin, mine output, metal content	458	870	1,077	1,519	[2]1,673
Tungsten, mine output, metal content	582	564	549	521	[2]688
Zinc:					
Mine output, metal content	402,600	432,000	487,596	498,890	541,000
Metal	62,852	68,195	63,829	126,159	160,733
NONMETALS					
Barite	395,500	444,500	414,500	409,100	375,000
Boron materials, crude (borates)	[e]6,000	[e]12,000	[e]21,000	16,644	14,000
Cement, hydraulic—thousand tons	2,020	[r]2,398	2,169	3,080	2,590
Chalk	269,755	361,800	485,174	475,000	470,000
Clays:					
Bentonite	18,805	[r]17,851	18,200	30,500	31,000
Fire clay	13,037	[r]14,658	13,325	8,520	8,000
Kaolin	3,752	[r]6,563	5,500	[e]6,000	6,000
Common clay	252,948	[r]472,000	309,800	754,256	750,000
Diatomite	4,923	[r]7,271	7,300	7,300	7,300
Feldspar	2,461	2,176	15,600	21,600	25,000
Gypsum, crude	168,936	217,490	280,000	350,000	350,000
Mica	100	[r]16	50	574	550
Nitrogen: N content of ammonia	81,000	[e]80,000	61,700	97,500	84,700
Phosphates, crude: Guano	--	5,000	13,900	98,364	29,100
Salt, all types	348,056	398,820	456,987	506,000	485,000
Stone, sand and gravel:					
Dimension stone:					
Marble	7,067	[r]12,014	12,050	3,072	3,000
Slate	25,300	[r]18,655	18,800	[e]19,000	18,000
Crushed and broken stone:					
Dolomite	5,510	[r]3,880	4,250	[e]4,300	4,200
Limestone	3,371	[r]3,772	3,175	3,800	2,590
Quartz and quartzite	2,170	[r]1,357	1,900	[e]2,000	2,000
Silica—thousand tons	80	[r]43	90	18	20
Sand and gravel—do	2,887	[r]2,377	3,596	2,538	2,850
Sulfur:					
Elemental:					
Native	102	98	105	[e]100	100
Byproduct of metallurgy	18,000	[e]20,000	[e]20,000	20,000	20,000
Sulfuric acid, gross weight	47,292	53,762	51,801	170,801	226,760
Talc and related materials:					
Talc	231	[r]1,090	1,095	[e]1,100	1,100
Pyrophyllite	8,678	[r]5,486	7,500	[e]8,000	7,500

See footnotes at end of table.

Table 1.—Peru: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	5,661	3,182	5,457	4,200	6,200
Coal:					
Anthracite, run of the mine	41,235	[r]47,429	89,471	157,000	120,000
Coke, all types[e]	10,000	10,000	10,000	10,000	10,000
Gas, natural:					
Gross million cubic feet	68,970	73,118	65,500	71,600	73,000
Marketed do	31,877	21,053	[e]21,000	[e]21,000	21,000
Natural gas liquids:					
Natural gasoline and other[6] thousand 42-gallon barrels	521	464	353	344	350
Propane do	60	47	75	86	90
Butane do	7	9	9	9	10
Total do	588	520	437	439	450
Petroleum and refinery products:					
Crude do	55,079	69,952	71,356	70,431	71,197
Refinery products:					
Gasoline:					
Aviation do	([7])	1	--	--	--
Motor do	11,102	13,088	12,810	13,513	14,500
Jet fuel do	1,812	2,657	3,236	3,755	4,200
Kerosine do	5,538	6,156	6,741	7,003	7,500
Distillate fuel oil do	9,746	11,949	12,422	13,071	13,700
Residual fuel oil do	14,523	15,462	16,656	16,896	17,000
Lubricants do	70	141	85	124	130
Liquefied petroleum gas do	[r]1,214	1,237	1,148	1,410	1,600
Asphalt do	212	181	234	256	270
Refinery fuel and losses do	60	193	262	207	250
Unspecified do	122	104	159	331	350
Total do	44,399	51,169	53,753	56,566	59,500

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through July 15, 1983.

[2]Reported figure.

[3]Output reported by Empresa Minera del Centro del Perú S.A.

[4]Includes electrowon copper cathode production by Empresa Minera del Perú S.A., at Cerro Verde I, as follows: 1978—28,426 tons; 1979—33,111 tons; 1980—33,279 tons; 1981—33,366 tons; and 1982—33,532 tons.

[5]Excludes sponge iron production as follows: 1980—33,826 tons; 1981—53,704 tons; and 1982—42,968 tons.

[6]Includes hexane.

[7]Less than 1/2 unit.

TRADE

Low world mineral prices were responsible for the lessened contribution by the mining industry to Peru's export earnings. In 1981, mining accounted for 48% of total export earnings, but in 1982, its contribution dropped to 41%. The total value of nonfuel mineral exports declined to an estimated $1.3 billion from the already depressed 1981 level of $1.6 billion.

Iron ore was the only commodity among the major nonfuel minerals exported that indicated a gain in both volume and value above that of 1981. Copper, which accounted for 14% of the total value of exports, continued to be the leading Peruvian nonfuel mineral export, followed by zinc, which accounted for almost 7%. Copper exports grew 1% in volume over that of 1981, but lost 14% in value. Zinc exports declined less than 1% in volume and lost 9% in value. Refined silver exports increased 8% in volume but declined 34% in value, and would have shown a greater loss except for the midyear upturn in prices.

Because world silver prices continued to fall during the first 6 months, in July the Government announced a suspension of international sales of refined silver. This was to include as much as 6 million troy ounces not already sold under contract. The ban was lifted in September, but some reports indicated it was never strictly enforced.

Minero Perú Comercial S.A. (MINPECO), the state marketing agency, no longer enjoys a monopoly on Peruvian mineral exports, but it still was responsible for an estimated 87%. MINPECO transactions indicated that in 1982 the value of U.S. purchases declined by almost 57%, while those of Western Europe increased by almost 17%. Peru's exports to other geographic areas of the world also declined in value, although some particular mineral exports to individual countries did increase in volume.

COMMODITY REVIEW

METALS

Cobalt.—Early in 1982, CENTROMÍN PERÚ and the British firm, Programmed Neuro Cybernetics Ltd., conducted a $1 million aerial exploration survey over the Sur Chico area of southern Peru. The project was part of a general exploration program for strategic and precious metals deposits. As a result, Neuro Cybernetics identified a belt of copper-cobalt deposits extending perpendicular to Monterrosas and Comsa Creeks in Ica Department. A CENTROMÍN PERÚ subsidiary, Cía. Minera Los Montes, recently opened a small 1,000-ton-per-day underground copper mine in the same area, about 20 kilometers northeast of Ica. Laboratory tests performed by this company indicated that pyrites contained in the copper tailings produced a concentrate with a 0.4% cobalt content. Samples of the tailings and the pyrite concentrate were sent to an interested Finnish firm, Outokumpu Oy.

HIERRO PERÚ continued to examine the banking feasibility and market study performed by the U.S. Trade and Development Program (TDP) to assist in determining the commercial viability of producing a pyrite concentrate averaging a minimum of 0.58% cobalt from tailings at their San Nicolás iron ore beneficiation plant. A feasibility study for this project was not initiated in 1982, although the TDP recommended that one be undertaken.

Copper.—Peru reversed its downward trend in copper production and registered an 8% increase in output, primarily because of fewer labor problems. SPCC, which endured a 2-month strike in 1981, lost about 20 days because of strike activity at the Toquepala Mine and Ilo smelter. SPCC delayed decisions to expand capacities at the smelter and the Toquepala and Cuajone Mines pending improved copper market conditions. A proposed geothermal power project in the Moquegua area was also postponed. SPCC unit production costs rose 29% in 1982 principally because of high fuel prices. SPCC's toll refining costs, including a 16% sales tax, at the MINERO PERÚ Ilo refinery were $281 per ton, about $100 more than it would have cost SPCC in the United States.

MINERO PERÚ slightly increased copper cathode production from the Cerro Verde I copper oxide mine near Arequipa. About 110,000 tons of sulfuric acid was supplied to the Cerro Verde I operation by MINERO PERÚ's zinc refinery at Cajamarquilla. Copper cathode production at Cerro Verde reached 33,532 tons.

In addition to the main Cerro Verde cathode plant, there were two experimental pilot plants in operation. One was designed to perform short-term investigations for improving copper oxide technology at the main plant. The other pilot operation treated ore from the 1.2 billion tons of copper sulfide reserves, known as Cerro Verde II, which underlies the oxide deposit. The pilot plant produced 3,084 tons of 40% copper concentrate, a 25% increase over that of 1981. The sulfide pilot plant also performed tests to recover molybdenum.

At MINERO PERÚ's electrolytic copper refinery at Ilo, production increased to 140,859 tons, or approximately to the 1980 level. Expansion plans for this refinery have been postponed. In 1982, the company installed a 100-ton-per-year pilot anodic slimes plant to recover gold, silver, and selenium. Also, about 288 tons of byproduct nickel sulfate was obtained from reprocessing 800 tons of cathodes that had accumulated from the electrolytic purification circuit during the 7 years of refinery operation.

Because of a significant increase in

ore production from the Cobriza Mine, CENTROMÍN PERÚ reduced its purchases of copper to supply the La Oroya metallurgical complex from 45% of output in 1981 to about 28% in 1982. Total copper production at La Oroya was 53,555 tons, slightly less than that of 1980.

These three large mining companies accounted for 81% of Peru's copper production in 1982. The medium-sized mining sector produced 12% of the total copper production. Privately owned Cía. Minera Patívilca S.A. was the largest copper producer in this category. The company's concentrate output contained about 5,450 tons of copper, a 14% increase over the 4,800 tons produced in 1981.

Cía. Minera Los Montes brought the Monterrosas copper mine near Ica onstream in March 1982. The mine produced 8,907 tons of concentrate containing slightly over 31% copper and 0.43 ounce of gold per ton. A full year's production was expected to reach 13,000 tons of concentrate.

Some new copper development projects were affected by the depressed international market price and company financial austerity measures. MINERO PERÚ was unable to activate its $290 million development plan for the Cerro Verde II deposit because of unresolved financing problems. After obtaining two loans totaling $92 million from Canada and the United States, MINERO PERÚ negotiated with Japanese interests for a $130 million loan to be repaid by the delivery of 75% of the copper concentrate production. This loan prospect dimmed as the lenders pondered a worst-possible-case scenario which envisoned that the price of copper could drop low enough that even 75% of Cerro Verde II's production would not cover operation costs, interest rates, and amortization. The Japanese wanted the Government to guarantee their loan to MINERO PERÚ, and the Government appeared unwilling to make this commitment. Both MINERO PERÚ and the Government faced considerable financial and political pressures to reach a loan agreement. Cerro Verde I oxide ore was projected to be depleted in mid-1985, and if Cerro Verde II has not come onstream, the company will be forced to dismiss over 1,000 workers. They will also face considerable financial loss associated with prior loan commitments and investments already made in the project. The economic and employment loss to the surrounding area, including the politically powerful nearby city of Arequipa, as well as the projected loss of much needed Government revenue are other important factors that require consideration.

CENTROMÍN PERÚ deferred its planned copper circuit modernization project at La Oroya until at least 1984. The search for partners to develop the 354 million tons of Toromocho copper ore reserves was also deferred. This deposit was located 142 kilometers east of Lima in the District of Morococha. The project cost was estimated at $800 million for a production of 75,000 tons per year of refined copper, plus quantities of silver, molybdenum, and tungsten.

In 1982, Empresa Minera Especial Tintaya S.A., obtained the $215 million in loans necessary to proceed with development of the Tintaya copper deposit, located near Cuzco in southern Peru. The company is 90% jointly owned by MINERO PERÚ and CENTROMÍN PERÚ, with a 10% interest held by the Government financing corporation, COFIDE.

By the end of the year, mine and plant equipment orders were placed and infrastructural construction was well underway. The project was scheduled to go onstream in September 1984, and produce 160,000 tons of 33% copper concentrate annually.

In 1982, MINERO PERÚ was granted special rights to the La Granja copper deposit located in the District of Querecoto, Province of Chota, Department of Cajamarca. La Granja ore reserves were estimated at 320 million tons containing 0.78% copper and 4 grams of gold per ton. A special mining company, similar to Tintaya, was expected to be established. Peruvian interests, including 25% held by MINERO PERÚ, would hold 55% of the equity, and a foreign group represented by the West German company, Kupfer Exploration Metalgesellschaft, would hold the remaining 45% interest. The estimated investment cost was $400 million at 1982 prices. A $12 million feasibility study was to be undertaken by Kupfer during the next 2 years.

MINERO PERÚ, France's Bureau de Recherches Géologiques et Minières, and its subsidiary, Coframines, agreed to create a special mining company to develop the Tambo Grande polymetallic deposit in northern Peru. The deposit lies about 50 kilometers from the Ecuadorean border near Paita. Congressional approval of the venture was expected. Tambo Grande was estimated to contain 42 million tons of reserves grading over 2% copper, 1% zinc,

and 1 troy ounce of silver per ton. Coframines was expected to initially control 75% of the new company.

Other MINERO PERÚ copper projects were dormant in 1982, including Quellaveco Michiquillay, the Bambas, Berenguela, Antamina, and Cañariaco.

Gold.—CENTROMÍN PERÚ continued to be Peru's largest single gold producer. Refined gold at the La Oroya metallurgical complex reached 45,216 troy ounces, a 7% increase over that of 1981, and represented nearly 29% of Peru's total gold production. Minas Ocoña S.A., the largest privately owned gold producer, achieved a 60% increase over that of 1981 when production reached 18,166 troy ounces. Ocoña also began producing refined gold.

These increases did not prevent an overall 10% decrease in Peru's total gold production. The known contribution of placer gold to total production dropped from the revised 1981 level, primarily because of poor weather conditions. Even so, gold recovery from placer deposits represented one-half of total output.

Estimated recoverable gold production is shown by source, in troy ounces, in the following table:

	1981	1982
In ores and concentrates	9,517	9,645
Refined and in blister	55,781	69,606
In placer gravels	r110,759	78,416
Total	r176,057	157,667

rRevised.

A meaningful estimate of Peru's true gold production has proved difficult to ascertain. For the most part, this is because placer gold production estimates depend on purchases made by the Banco Minero through its 20 offices located throughout the country. Six of these offices are located in the southeastern Madre de Dios region, at Mazuko, Huaypetue, Laberinto, Colorado, Puerto Maldonado, and Quincemil. This region accounted for about 60% of all placer purchases. However, it was generally acknowledged that at least 30% of the gold produced from this region may be smuggled out of Peru and sold elsewhere, mainly Brazil. In Brazil, gold could be sold for U.S. dollars and at a higher per troy ounce price than that paid by the Banco Minero. Furthermore, the Banco Minero must pay for its purchases in Peruvian soles, a currency that has been undergoing devaluation.

The Banco Minero purchased 78,416 troy ounces of gold valued at almost $23 million. Gold exports amounted to 157,137 troy ounces, a 13% decrease from that of 1981.

A gold boom on the northern coast began in 1981, about 10 kilometers north of Chimbote, in the delta area of the Santa River. In 1982, through the International Executive Service Corp., the new concession holders engaged the services of a U.S. placer mining engineer. The consultant was to carry out an evaluation study of the Santa Rita beach placer deposit.

The Arias Group subsidiary, Cía. Minera Poderosa S.A., opened the Poderosa Mine in August. The mine was located in Pataz Province, La Libertad Department, in the same general region as the Arias Salpo and Urumalqui Mines. The new Poderosa Mine produced 3,858 troy ounces of gold and 1,190 troy ounces of silver.

The gold boom in the southeastern region continued. CENTROMÍN PERÚ operated its pilot plant at the Bijahual concession on a sporatic basis throughout the year as mechanical adjustments were made. Gold recovery of 85% was achieved at the plant from the black sand concentrate.

In addition to gold, the concentrate contained magnetite, titanium, and, in some places, traces of chromium and tin. A small laboratory was installed to monitor any improvements in gold recovery. An examination of two drill cores revealed that the gold content in the gravel may drop substantially with depth. A complete drilling program for the area was deemed necessary to establish the correct mining technique. However, CENTROMÍN PERÚ's severely curtailed 1983 budget necessitated a postponement of further exploration in this area.

MINERO PERÚ divided its 345-square-kilometer San Antonio de Poto gold deposit into four areas: Arequipa Pampa, Ancocala, Huachani, and Pampa Blanca. Domestic or foreign companies can participate in their development, either on a joint-venture basis or by renting the different areas under contract. Each of the four areas was large enough to be subdivided.

Independent gold panners, grouped in cooperatives, continued to work at the artisan level in parts of the San Antonio de Poto deposit. These cooperatives paid MINERO PERÚ a small royalty on their production. It has not proved to be a completely satisfactory arrangement because

declared production was small and MINERO PERÚ was unable to adequately monitor mining operations.

Aurífera Sur Oriente S.A. (AUSORSA) continued to hold 16 concessions totaling more than 15,000 hectares in the Huaypetue and Puquibe region. Because of low gold prices, the company ceased operating its pilot plant for the active Huaypetue concessions. Production amounted to 1,029 ounces, about one-half of the 1981 output. Through continued exploration, gold deposits exceeding 0.2 gram per cubic meter were located. The company began negotiations with possible investors and an agreement was expected in 1983.

Rio Tinto Finance and Exploration, a subsidiary of Rio Tinto Zinc Corp., began development work on its contracted 24,000-hectare portion of AUSORSA's concessions. Rio Tinto's exploration drilling and bulk sampling program revealed ore grades of over 0.2 gram of gold per cubic meter. Nevertheless, the company closed down the operation. A portion of the former Rio Tinto area was included in the ongoing AUSORSA negotiations with new investors.

Texasgulf Perú S.A., a subsidiary of Texasgulf Minerals and Exploration Co., began a gold exploration program on several concessions around the Madre de Dios and Inambari Rivers.

Several epithermal gold-silver deposits were identified in the southern volcanic fields of Peru. A few claims were filed for the very conspicuous hydrothermally altered zones. One prospect in particular, the Jarguarazo, was thought to be analogous to El Indio in Chile, although the whole southern area was described as characteristically similar to this type of deposit. The Jarguarazo Prospect is located near Puquio in the Department of Ayacucho. Cía. Minera Milpo S.A. and Cía. San Ignacio de Morococha S.A. (SIMSA) joined to have the area investigated by an independent consultant.

Iron Ore.—HIERRO PERÚ continued to operate at about 75% of capacity because of a continued weak market demand. Production by category for 1981-82 is shown in the following table, in thousand metric tons:

	1981	1982
Pellets	1,504	1,422
Low-silica pellets	193	60
High-grade sinter feed	3,359	2,893
Pellet feed in slurry form	202	171
Pellet feed in cake form	811	1,193
Oxide ore	--	35
Total	6,069	5,774

Beneficiated iron ore exports totaled 5.6 million tons valued at almost $108 million, indicating an 8% increase in volume and a 16% increase in value over that of 1981. The Republic of Korea purchased 36% and Japan purchased 34% of the exported iron ore. Yugoslavia was the third largest purchaser with a 19% share. The United States imported 35,284 tons from Peru, less than one-half of the 1981 volume. Other lesser purchasers of iron were the Netherlands, Austria, Czechoslovakia, and Argentina.

HIERRO PERÚ concluded several infrastructural projects including additional employee housing, reconditioning work on the San Nicolás pier, and powerplant repairs. A ground water exploration program was concluded and studies indicated that approximately 500 liters per second of underground water was available from two sources. The company was evaluating data to determine the best methods for utilization.

The feasibility study to develop 300 million tons of transitional ore for export using a gravimetric concentration method was concluded in 1982. It was expected that bids would be invited on the plant design study.

Iron and Steel.—Peru's largest steelmaker, state-owned Empresa Siderúrgica del Perú (SIDERPERÚ) announced a 2-month suspension of operations effective September 1, 1982. About 2,500 employees were to be placed on vacation status. The action resulted from depressed steel market conditions that caused the company to accumulate excess stocks. The plant remained closed during 1982, although a startup was expected in early 1983.

In view of SIDERPERÚ's worsened financial status, final approval was uncertain for the plant modernization project to increase raw steel capacity to about 520,000 tons per year. The feasibility study for the modernization was scheduled for completion in October.

A new private sector ministeelworks was under construction by Empresa Laminadora del Pacífico S.A. Located at Pisco, south of Lima, the plant planned to utilize two 40-ton electric furnaces to produce a capacity of 180,000 tons per year of steel billets. The company expected to export 40% of its output and also supply an affiliated company, Aceros Arequipa S.A., with feedstock for its bar and rod mills.

Lead and Zinc.—MINERO PERÚ's Cajamarquilla zinc refinery completed its first full year of operation. The refinery operated at an estimated $68 million loss because of high energy rates, low mineral prices, a

heavy debt burden, and higher-than-estimated treatment costs. The refinery was responsible for about 70% of MINERO PERÚ's projected total 1982 financial loss of $95 million. The refinery output was estimated at 92,265 tons of zinc despite an equipment breakdown that shut down the roaster for 10 days. The CENTROMÍN PERÚ metallurgical complex at La Oroya produced an estimated 68,489 tons of zinc bars and 76,990 tons of refined lead, slightly less lead than that of 1981.

CENTROMÍN PERÚ continued to be the largest single lead and zinc producer, contributing 40% of the country's total lead output and 43% of the zinc from its own mines. CENTROMÍN PERÚ received approval for a $19 million loan arranged by the Inter-American Development Bank to continue the expansion project at its Andaychagua Mine and develop it as an independent unit from the San Cristóbal Mine. In December 1981, the bank had approved a direct $14 million loan for this project. Primarily considered a silver mine, the associated mineral production was projected to increase to 6,000 tons of 45% lead concentrate and 28,000 tons of 55% zinc concentrate upon completion in 1985.

In the medium mining sector, Cía. Minera Atacocha S.A. was the largest lead producer. Atacocha sought investors for a planned $6.5 million, two-stage expansion of its mine and concentrator from 1,600 tons to 2,200 tons of ore per day. The project was to include increasing the power output from the Marcopampa hydroelectric plant from 350 kilowatts to 1.7 megawatts per hour. The Atacocha Mine is located in the District of Yanacancha, Paso Department, about 18 kilometers north of the town of Cerro de Pasco. Atacocha produced a record 23,685 tons of lead concentrate containing about 15,700 tons of recoverable lead, 1.1 million troy ounces of silver, and 3,000 troy ounces of gold. The 35,501 tons of zinc concentrate production contained about 18,500 tons of recoverable zinc.

The largest private zinc producer was SIMSA, with a concentrate output containing 47,300 tons of zinc and 3,300 tons of lead. SIMSA operated the San Vicente Mine in San Ramón, about 315 kilometers east of Lima. This was the only mine operating in the central jungle region. SIMSA redesigned its flotation circuit and was installing a magnesium leaching plant to increase concentrate content to 60% zinc and less than 1% magnesium oxide.

Cía. Minera del Madrigal continued the normal exploration efforts required to maintain production at its mine located about 192 kilometers north of Arequipa. The Madrigal Mine is 50% owned by Homestake Mining Co. A prefeasibility plan for a new hydroelectric plant was postponed. The company borrowed $2 million from the Banco Minero, adding to a $1.5 million debt owed to the Bank of America. The mine ore contains two troy ounces of silver per ton and accounted for about two-thirds of the company earnings.

Compañía Minera Santo Toribio S.A., a minor lead and zinc producer, planned a 1983 program to increase its flotation mill capacity from 600 to 1,500 tons per day. The $3 to $4 million project was facilitated by the company acquiring two new partners, Cía. de Minas Buenaventura S.A. and Construcciones Villasol S.A. Proven ore reserves at the company's mine, located about 21 kilometers from Huaraz in Ancash Department, were placed at 27 million tons grading 1.6% lead, 4.5% zinc, and 1.5 troy ounces of silver per ton.

Cía. Minera Santa Luisa S.A. announced it would invest over $3 million on a new cone crusher and grinding mill, development work, drilling, and geological studies at its Huanzalá Mine. The mine, located about 320 kilometers west of the town of Huanuco, was 70% owned by Mitsui Mining and Smelting Co. Ltd. of Japan. The mine produced 50,000 tons of concentrate containing about 22,600 tons of recoverable zinc, 18,000 tons of concentrate containing about 10,600 tons of recoverable lead, and a total of 1.3 million troy ounces of silver. All output was purchased by Mitsui for treatment at the Hachinohe Smelting Co. Ltd.'s refinery in Japan.

Silver.—A midyear upturn in the international price of silver enabled some mining companies to decrease their financial losses. A few companies ended the year with a net profit. The Governments of Peru and Mexico believed that their efforts to dissuade the United States from selling 100 million troy ounces of its stockpiled silver prevented market prices from plummeting much below the $5.11 per troy ounce reached on June 25.

Preliminary data indicated that Peru displaced Mexico as the largest silver producer in the world. The large mining sector accounted for about 30% of Peru's total silver production. The medium-sized mines together contributed almost 66%, and the

small mining sector contributed about 4%.

CENTROMÍN PERÚ's austerity program did not affect the $42 million expansion program at the Andaychagua Mine, designed to create a separate mining unit from the nearby San Cristóbal Mine. About $33 million in loans were obtained for this project, and the remainder was to be solicited as advance payment from purchasers. Ore throughput was to be increased from 200 to 1,000 tons per day upon completion of the new flotation plant. After expansion in mid-1985, silver production was expected to reach 1.2 million troy ounces per year contained in lead concentrate.

Buenaventura proceeded with a planned $22 million expansion program at its Uchucchacua, Julcani, and Orcopampa mines. The initial $12 million investment for the program was expected to be completed in 1983. Financing was obtained from the International Finance Corp. and commercial banks in the United States. The remainder of the expansion, not yet financed, was postponed until 1984. Buenaventura remained the largest private producer of silver in Peru, with output estimated at 6.4 million troy ounces, a 53% increase over 1981 production. It was primarily Buenaventura's increased output that enabled Peru to reach its record-high silver production in 1982.

Besides increasing average ore grade, Buenaventura initiated efficiency measures that were estimated to have reduced production costs for silver from $11 per troy ounce to about $7. The company expected to achieve an even lower unit cost in 1983. Exploration efforts, begun in 1981, enabled the company to upgrade ore mined at the Uchucchacua Mine from 11 troy ounces of silver per ton to 17 troy ounces per ton. Ore at Orcopampa was upgraded to average 13 troy ounces of silver per ton instead of 10 troy ounces.

At Minas de Arcata S.A., Peru's second largest private silver producer, silver concentrate output reached 6,985 tons in 1982 and contained about 3 million troy ounces of silver and 6,951 troy ounces of gold, a 19% increase in silver and a 28% increase in gold over that of 1981. Sales revenue from silver concentrate, however, was down 18% from that of 1981. Arcata planned to initiate a 14-month, $6 million expansion program in 1983 to increase ore capacity from 600 to 800 tons per day.

Corp. Minera Nor Perú S.A. completed the $15 million expansion of its Quiruvila copper-lead-silver-zinc mine, located in northern Peru in the Department of La Libertad. As a result, silver contained in the increased concentrate production rose to 2.1 million troy ounces, a 44% increase over that of 1981. This increase moved Nor Perú to rank third among Peru's private silver producers in 1982.

Corporación Minera Castrovirreyna S.A. planned to increase exploration efforts in 1983 because of declining ore grade. Despite a concentrator expansion to 500 tons per day, silver production declined from 1.5 million troy ounces in 1981 to about 1.3 million troy ounces in 1982. Average ore grade has fallen from 18 troy ounces of silver per ton in 1980 to 11 troy ounces per ton in 1982. The company estimated its production costs at $6 per troy ounce of silver.

Tungsten.—Production continued to edge upward, despite market prices that dipped below the producers breakeven points. Fermín Málaga Santolalla e Hijos Negociación Minera S.A. has operated the Pasto Bueno Mine for 41 years and continued to be Peru's largest tungsten producer. An expansion program was completed in 1982 and production reached 530 tons of concentrate containing 74.96% WO_3. CENTROMÍN PERÚ regained its position as second largest producer from increased output at both the Morococha unit and the Mahr Tunnel plant at the San Cristóbal unit.

There were several smaller producers that together accounted for the remainder of production. They were Compañía Minera Turmalina S.A., Piura Department; Compañía Minera San Diego S.A. at the San Judas Tadeo Mine in Juliaca Department; Compañía Minera Unión S.A. from the Mayucayan deposit in Chimbote Department; and Sociedad Minera Puquio Cocha S.A., which continued to recover tungsten concentrate from tailings accumulated at its copper flotation plant in central Peru.

Tungsten production by company was as follows, in metric tons of WO_3 content:

	1979	1980	1981	1982
Málaga Santolalla	192	296	358	397
CENTROMÍN PERÚ	403	209	130	239
Minera Regina	102	145	200	187
Others	58	50	50	45
Total	755	700	738	868

NONMETALS

Phosphate.—A feasibility study for the development of the Bayóvar phosphate deposit in the District of Sechura, south of Piura in northern Peru, was completed early in 1982. The study reportedly proved that a 30% P_2O_5 concentrate could be produced, but questioned the practical economics of a commercial operation. Nevertheless, Empresa Promotora Bayóvar S.A. (PROBAYOVAR), 60% owned by MINERO PERÚ, continued to explore the possibilities of expanding beyond the small pilot plant that has been in operation for several years.

One possible joint venture participant was Peru Phosphate Development Ltd. of New Zealand, which was organized in 1981 by Winstone Ltd. and Dalgety of New Zealand Ltd., to annually import about 100,000 tons of Peruvian phosphate rock concentrate. The Bayóvar concentrate proved particularly interesting to New Zealand because it can be applied directly to acidic soil. The company had proposed a modest $30 million project for Bayóvar that involved the construction of dock facilities and an expansion of phosphate rock concentrate production to 200,000 tons per year by 1990. However, by the end of 1982, the New Zealand company's immediate interest in the project reportedly waned because of low world market prices and a limited interest on the part of Peruvian consumers. PROBAYOVAR sold only 8,000 tons of its concentrate production, stockpiling the remaining 20,000 tons.

MINERAL FUELS

Coal.—Empresa Promotora de Carbón S.A. (PROCARBÓN) assumed responsibility for the development of the Jatunhuasi coal deposit. PROCARBÓN, jointly owned by CENTROMÍN, MINERO PERÚ, COFIDE, and Electricidad del Perú reversed their original decision to borrow $5 million from the Inter-American Development Bank for exploration studies of the Jatunhuasi and other coal deposits. Instead, it was planned to initiate two studies: an evaluation of existing reserves and a market study of projected domestic demand.

The small mining sector has maintained a particular interest in coal development projects. PROCARBÓN was established to promote the development and use of Peru's coal deposits. In 1982, the Government created a commission, chaired by the general manger of PROCARBÓN and partly composed of representatives from the small mining sector, to draft a law entitled, "Law for Substitutes and Complementaries of Petroleum Fuels." One of the main objectives of this legislation was to create conditions encouraging domestic coal consumption that could be supplied by the small mining sector.

The prospects for future development of MINERO PERÚ's Alto Chicama coal project were enhanced when a French company expressed interest in a joint venture. Additional reviews and new evaluation studies were to be undertaken.

Petroleum and Natural Gas.—A separate branch within state-owned PETROPERÚ was created to participate in joint petroleum exploration ventures. The new entity, Servicios Petroleros (SERPETRO), reportedly signed a preliminary agreement to develop Block 50 with a group headed by Hispánica de Petróleos S.A. (HISPANOIL). SERPETRO assumed a 25% interest in the venture. HISPANOIL, with a 30% interest, was seeking new partners after Pennzoil Co., with a 25% interest, and Neste Oy, with a 20% interest, dropped out. Block 50, located in the northern jungle area, abuts the western edge of Superior Oil Co.'s Block 2 concession.

In April, a contract was signed with Hamilton International Oil Co. del Perú (90%) and Petroinca S.A. of Lima (10%) for Block 7, located on the southwestern side of PETROPERÚ's Block 8. Hamilton International planned to drill early in 1983.

Superior drilled a 17,051-foot dry hole in Block 2 after an expenditure estimated at $32 million. A second wildcat was spudded in October and was expected to reach total depth in April 1983.

Belco Petroleum Corp. of Peru contracted for its third offshore area, Block Z-28. The new block encompassed 1 million acres in an irregular elongated pattern along the entire western edge of Blocks Z-1A and Z-2A. Belco completed geophysical surveys in the new acreage and expected to drill the first of two exploratory wells in 1983. Within 6 years Belco will select and relinquish one-half of the acreage in Block Z-28 back to the Government.

Peru's oil companies planned to spend about $600 million in 1983 for exploration and development. Crude oil reserves were estimated at 850 million barrels, which amounted to about 12 years production at current levels. Domestic consumption increased by an estimated 2% in 1982 and

new production capacity must be found to maintain export levels. The jungle area appeared to offer the most opportunity for increasing reserves and production since secondary recovery efforts at the Occidental-Bridas Talara project have not met expectations. Other secondary recovery projects were planned at PETROPERÚ's Zapotal-Laguna and Occidental's Los Organos projects.

During 1982, PETROPERÚ increased production at both its coastal and jungle fields. Secondary recovery from the coastal Talara Field remained at about the 1981 level. Belco's offshore fields increased production despite a platform fire that caused a slight setback. Diminished gas pressure and well rehabilitation projects decreased Occidental's total Peruvian production and lessened the overall positive impact of PETROPERÚ's gains.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Peruvian soles (S/) to U.S. dollars at the 1982 average exchange rate of S/697.57 = US$1.00. At the beginning of January 1982, the exchange rate was S/341.17 = US$1.00, and at the end of December 1982, the exchange rate was S/989.67 = US$1.00.

The Mineral Industry of the Philippines

By John C. Wu[1]

The economy grew 2.6% in 1982 compared with 3.1% (revised) in 1981. According to the Central Bank of the Philippines, the growth in the real gross national product (GNP) was attributed mainly to the increased domestic investment by the Government on roads, bridges, and other infrastructure projects. The growth rates for the three major sectors were 3.5% for agriculture, fishery, and forestry; 2.7% for manufacturing; and 2.8% for services. The GNP in 1972 constant dollars was estimated at $12 billion.[2]

Substantially lower export earnings, further depreciation of the Philippine peso, increases in the balance-of-trade deficit, and higher external debt prevented the economy from achieving its 6% growth targeted for 1982. Export earnings were down by 12.7% as prices and volumes of major export commodities fell. The Philippine peso was depreciated by 11.8% against the U.S. dollar. The balance-of-trade deficit rose 75% to $1 billion. The external debt increased 30% to $17 billion. However, the inflation rate decreased to 10%, from 13% in 1981. The labor force in the Philippines was 17.6 million, of which 5.1% was unemployed.

Because of low metal prices and high production costs, the mining industry suffered the worst year in its history. However, the mining industry contributed 2.6% to the Philippine gross domestic product (GDP).

According to the Philippines National Economic Development Authority, the percentage contributed to the GDP at current dollars by sector for the second half of 1982 was as follows, in percent:

Agriculture, fishery, forestry	25.2
Industrial sector:	
Mining and quarrying	2.6
Manufacturing	25.1
Construction	7.7
Electricity, gas, water	1.1
Service sector:	
Transport, communications, storage	5.3
Commerce	20.9
Services	12.1
Gross domestic product, total	100.0

Despite a smaller contribution by the mining sector to the GDP, the industry remained important. The Philippine mining industry was in a state of financial crisis. As a result of depressed metal markets, soaring energy costs, and record high interest rates, the mining industry reportedly suffered the biggest loss in its history. The industry's loss was estimated to be over $300 million.

Marinduque Mining and Industrial Corp. (MMIC), a major producer of cobalt, copper, and nickel, lost about $200 million. Atlas Consolidated Mining and Development Corp., the largest copper producer, was expected to lose $41 million. Marcopper Mining Corp. and Lepanto Consolidated Mining Co. Inc., the other major copper producers, were expected to have a combined loss of $13 million. Most small miners reportedly also suffered losses. Some companies suspended operations for 5 to 6 months and other companies closed their mines entirely. Benguet Corp. and Philex Mining Corp. reportedly were the only profitable companies in 1982.

The Government, in an effort to save the mining industry from further deterioration,

provided loans to financially troubled mining companies. According to the Central Bank of the Philippines, the administrator of the state-aid programs, eight gold and silver producers reportedly applied for assistance. Under the scheme, the company was allowed to borrow funds up to 100% of the value of the company's annual gold production for a maximum of 360 days at an annual interest rate of 14%. A similar program was also provided for copper producers to borrow up to 50% of the value of the company's annual copper production.

In mid-1982, when the world market prices of copper fell below 75 cents per pound, a 6-month special subsidizing program was established by the Government. The state-owned National Development Co. (NDC), the administrator of the program, was to purchase the copper concentrates offered by the producers at 75 cents per pound during July 1 to December 31, 1982. The program was to subsidize the price difference with the world market price and to prevent the Philippine copper industry from shuttering its mining operations.

The proposed aluminum smelter project reportedly was to be dropped because of a refusal of a special low electricity rate by the National Power Corp. of the Philippines. However, the 50,000-ton-per-year-capacity ferrochromium plant at Tagoloan in Misamis Oriental was completed. The construction of a copper smelter at Isabel in Leyte was almost completed in 1982. The smelter was scheduled to be operational in May 1983 with an annual initial production of 110,000 tons of copper and 624,000 troy ounces of gold and silver mixed in doré bars. A $375 million contract was expected to be awarded to a Japanese consortium led by Marubeni Corp. for construction of a direct-iron-reduction complex in Iligan City on Mindanao Island. As part of the modernization and expansion program of the National Steel Corp. (NASCO), a $43 million contract was also expected to be awarded to Davy McKee Ltd. of the United Kingdom.

In 1982, three major cement plants successfully converted their energy source from bunker oil to coal under the cement industry rationalization program. However, the construction of the first 1-million-ton-per-year-capacity cement plant was postponed owing to the financial difficulties of the CDCP Mining Corp. Construction of a $6.7 million phosphoric acid plant was expected to start at Pasig, southeast of Manila. The phosphoric acid plant, to be built by Power Gas of India, will be the first in the Philippines and the largest in Southeast Asia. In June 1982, a $17 million loan was approved by the International Bank for Reconstruction and Development (World Bank) for coal exploration in Samar, eastern and southwestern Mindanao. The Matinloc Oilfield, the third Philippine offshore field, was inaugurated on July 21, 1982.

PRODUCTION

The Philippines mineral production continued to decline in both value and quantity in 1982. The metallic sector was hit hardest by the prolonged low metal prices and high production costs. The mineral production value dropped 12% to $1.5 billion in 1981 from that of 1980. According to the Philippines Bureau of Mines and Geo-Sciences, the value of mineral production dropped by another 12% for the first half of 1982 from that of 1981.

As a result of the depressed demand for raw materials in the world market, production of chromium, cobalt, copper, nickel, silver, and zinc declined in 1982. However, gold production increased slightly owing to the improvement in mill recovery. Production of copper and gold remained the most important industries in the Philippine mining sector. These two industries contributed over 55% of the mineral output value.

A significant improvement was reported in the Philippine mineral fuel industry. Coal production jumped 84% to 587,000 tons in 1982 from that of 1981 because of the increased coal production from the Unong deposit on Semirara Island. The output of crude oil also increased substantially owing to the inauguration of the country's third offshore oilfield, Matinloc, in July 1982.

Table 1.—Philippines: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodities[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Chromium: Chromite, gross weight:					
Metallurgical-grade	141,048	167,785	160,961	156,237	190,000
Refractory-grade	398,850	388,325	335,099	283,019	160,000
Total	539,898	556,110	496,060	439,256	350,000
Cobalt, mine output, metal content	1,192	1,370	1,331	997	500
Copper, mine output, metal content	263,590	298,300	304,504	302,328	286,000
Gold, troy ounces	586,531	535,166	643,806	753,451	793,000
Iron and steel:					
Iron ore and concentrate, thousand tons	2	.6	--	6	10
Ferroalloys:					
Electric-furnace ferrosilicon[e]	14,000	18,000	20,000	22,400	27,500
Electric-furnace ferrochromium[e]	10,000	10,000	10,000	10,000	12,000
Steel, crude, thousand tons	276	397	330	350	350
Lead, mine output, metal content	1,448	1,949	1,812	1,066	--
Manganese ore and concentrate, gross weight	3,911	3,769	2,556	3,113	3,000
Molybdenum, mine output, metal content	55	141	91	94	100
Nickel:					
Mine output, metal content	29,528	33,287	47,571	29,247	18,000
Metal, smelter	18,737	21,478	25,881	21,485	11,000
Silver, mine output, metal content, thousand troy ounces	1,640	1,838	1,952	2,012	1,900
Zinc, mine output, metal content	9,468	9,670	6,845	5,289	3,000
NONMETALS					
Asbestos	159	--	6	--	--
Barite	5,548	6,667	5,355	2,135	9,000
Cement, hydraulic, thousand tons	4,340	3,950	4,481	4,090	4,000
Clays:					
Bentonite	1,569	3,123	5,053	5,527	5,000
Red	12,271	24,126	31,561	6,613	30,000
White	7,040	402,241	15,232	10,483	15,000
Rock	373	1,393	1,039	613	1,000
Other	502,241	428,639	453,494	571,386	500,000
Feldspar	18,073	19,064	15,925	15,736	16,000
Gypsum and anhydrite:					
Natural	[e]1,700	--	--	412	400
Synthetic[e]	110,000	110,000	110,000	110,000	110,000
Lime	33,317	53,887	87,363	84,837	84,000
Nitrogen: N content of ammonia	[e]40,000	[e]40,400	39,100	32,400	14,800
Perlite	3,168	3,806	7,973	7,530	7,500
Phosphate:					
Guano	821	3,158	24,836	2,051	3,000
Phosphate rock	1,074	2,495	17,679	8,380	10,000
Pyrite and pyrrhotite (including cuprous), gross weight	110,774	87,408	115,231	97,872	61,000
Salt, marine	225,650	322,131	346,387	355,289	350,000
Sand and gravel:					
Alumina sand	31,414	26,547	25,979	33,513	33,000
Silica sand, thousand tons	419	407	478	469	500
Other[3], thousand cubic meters	9,964	11,132	13,310	13,319	13,000
Stone:					
Andesite	8,461	276,221	231,872	22,484	22,000
Basalt, cubic meters	--	421	--	602,529	600,000
Dacite	18,841	18,136	10,636	30,047	15,000
Diorite	90,128	112,319	86,800	77,782	80,000
Dolomite	7,600	10,375	11,318	90,095	100,000
Limestone[4], thousand tons	9,232	10,156	10,098	10,676	10,000
Marble (dimension), unfinished, cubic meters	8,692	5,966	9,288	6,719	7,000
Volcanic cinder, do.	346,235	827	2,651	1,050	1,000
Sandstone	91,337	47,006	57,467	36,593	40,000
Serpentine	2,571	7,579	23,571	9,040	10,000
Tuff	90,493	106,327	132,721	122,788	120,000
Quartz	28,190	39,298	61,533	45,282	40,000
Crushed, broken, other[5], thousand cubic meters	4,066	1,908	1,687	1,500	1,500
Sulfur: S content of pyrite	51,510	40,645	53,583	45,511	45,000
Talc	4,061	3,570	863	446	450
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades	255,054	263,132	325,008	318,170	587,000
Petroleum and refinery products:					
Crude, thousand 42-gallon barrels	--	8,570	3,620	2,500	7,500
Refinery products:					
Gasoline, do.	14,423	14,632	11,751	9,654	NA
Jet fuel, do.	2,684	2,174	2,270	2,184	NA
Kerosine, do.	3,516	4,055	3,620	3,152	NA

See footnotes at end of table.

Table 1.—Philippines: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodities[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Distillate fuel oil thousand 42-gallon barrels	14,966	16,532	17,204	16,361	NA
Residual fuel oil do	29,500	29,278	27,333	26,460	NA
Other do	2,542	3,002	3,421	3,251	NA
Refinery fuel and losses do	4,195	3,536	3,203	3,114	NA
Total do	71,826	73,209	68,802	64,176	NA

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through June 24, 1983.

[2]In addition to the commodities listed, the Philippines produces platinum-group metals as byproducts of other metals, but output is not reported quantitatively, and no basis is available to make reliable estimates of output levels.

[3]Includes "pebbles" and "soil" not further described.

[4]Excludes limestone for road construction, reported in cubic meters, which totaled 9,687 cubic meters in 1978, 2,932 cubic meters in 1979, 9,741 cubic meters in 1980, and 24,092 cubic meters in 1981; data for 1982 are not available.

[5]Includes materials described as rock, crushed or broken; stones, cobbles, and boulders; rock aggregates; and broken adobe.

TRADE

The merchandise trade balance showed another record deficit in 1982. A substantial drop in export earnings owing to poor world prices of coconut, sugar, copper, and other traditional export commodities resulted in a 12.7% decrease in export earnings. However, imports also fell 1.8% because of a 19% drop in oil imports as a result of a 3.4% drop in import volume and lower world prices of oil.

Philippine merchandise trade during 1980-82 was as follows, in millions of dollars:

	1980	1981	1982
Exports	5,789	5,722	4,995
Imports	7,726	7,946	7,800
Trade balance	-1,937	-2,224	-2,805

According to the Philippines Bureau of Mines and Geo-Sciences, mineral exports in 1981 were valued at $910.6 million compared with $1,155.8 million in 1980. The main buyers of the Philippine minerals were Japan, 60.5%; the United States, 14.7%; the Republic of Korea, 8.7%; Taiwan, 6.2%; and other, 9.9%. The principal purchasers of copper concentrates were Japan, 67%; the Republic of Korea, 13%; Taiwan, 7%; the United States, 7%; and other, 6%.

Oil and petroleum-related products accounted for about 27% of the imports in 1982 compared with 30% in 1981. Imports of machinery, transport equipment, and base metals remained the other major imports in 1982.

In 1982, the United States and Japan continued to be the major trade partners of the Philippines. The Philippine trade with the European Economic Community (EEC) suffered a major setback as a result of growing protectionism by some members of EEC.

Table 2.—Philippines: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	--	2	--	All to Hong Kong.
Unwrought	r588	10	--	Do.
Semimanufactures	2,925	2,879	--	Indonesia 1,859; Hong Kong 752; Singapore 193.
Chromium: Ore and concentrate	484,109	397,382	104,459	Japan 134,393; Sweden 52,551; China 48,605.
Copper:				
Ore and concentrate thousand tons	1,149	1,130	72	Japan 771; Republic of Korea 146; China 30.
Matte and speiss including cement copper	6,703	9	--	All to United Kingdom.
Metal including alloys:				
Scrap	1,730	1,207	--	Japan 457; India 211.
Unwrought	--	1	--	All to Japan.
Semimanufactures	60	34	--	Do.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	4,264	--		
Pyrite, roasted	59,535	35,408	--	Hong Kong 5,415.
Metal:				
Scrap	2,170	1,411	--	Japan 427.
Pig iron, cast iron, related materials	26	--		
Ferroalloys	18,001	31,268	2,117	Japan 26,430; Indonesia 1,500.
Steel, primary forms	--	15,250	--	Japan 10,250.
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,286	1,399	--	Singapore 934; Malaysia 384; Australia 65.
Universals, plates, sheets	120,162	5,143	--	NA.
Hoop and strip	9	1	--	Mainly to Australia.
Tubes, pipes, fittings	1,800	2,145	--	Australia 2,067.
Castings and forgings, rough	851	1,318	493	Australia 700; Japan 96.
Lead:				
Ore and concentrate	3,232	1,801	--	All to Japan.
Metal including alloys, all forms	894	4	--	All to Papua New Guinea.
Manganese: Ore and concentrate	1,000	2,800	--	All to Japan.
Nickel:				
Ore and concentrate	608,824	557,583	--	Do.
Metal including alloys:				
Scrap	125	22	--	Do.
Unwrought	18,823	15,469	8,008	Netherlands 3,950; Japan 2,562; Republic of Korea 800.
Semimanufactures	4,135	2,660	2,000	Netherlands 660.
Silver:				
Ore and concentrate[1] value, thousands	$239,149	$215,183	$36,009	Japan $137,672; Republic of Korea $14,750.
Waste and sweepings troy ounces	--	3,762	--	All to United Kingdom.
Metal including alloys, unwrought and partly wrought value, thousands	$76	$40	--	All to Hong Kong.
Tin: Metal including alloys:				
Scrap	r37	27	10	Japan 10; Singapore 4.
Semimanufactures	--	225	--	All to Kenya.
Zinc:				
Ore and concentrate	14,859	11,873	--	All to Japan.
Metal including alloys:				
Scrap	184	370	--	Japan 310.
Semimanufactures	100	45	--	Japan 35.
Other:				
Ores and concentrates	180	1,247	62	Japan 1,108; Chile 62.
Ashes and residues	r1,817	2,876	--	Japan 2,435; Singapore 35.
Base metals including alloys, all forms	r357	693	60	Japan 385; Hong Kong 159.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	11	--	All to Hong Kong.
Grinding and polishing wheels and stones value, thousands	$10	$35	--	All to Singapore.
Cement	767,170	492,734	--	Indonesia 128,640; India 123,305; Hong Kong 103,875.
Clays and clay products:				
Crude, unspecified	241	267	--	All to Singapore.

See footnotes at end of table.

Table 2.—Philippines: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products —Continued				
Products:				
Nonrefractory value, thousands	$8,422	$6,266	$528	Singapore $2,272; Hong Kong $1,838; Malaysia $456.
Refractory including nonclay brick ——do——	$203	$710	$1	Indonesia $289; Japan $221; Singapore $72.
Fertilizer materials: Manufactured:				
Ammonia	2	2	--	All to Hong Kong.
Nitrogenous	550	100	--	Hong Kong 50; Malaysia 50.
Unspecified and mixed	1,000	5	--	All to Saudi Arabia.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1	--		
Sodium hydroxide	--	3	3	
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	319	2,182	17	Japan 1,191; Malaysia 75.
Worked	3,799	3,934	999	Hong Kong 1,494; Japan 709.
Dolomite, chiefly refractory-grade	--	29,467	--	All to Japan.
Gravel and crushed rock	2,936	7,877	--	Japan 4,655; Guam 2,705; Hong Kong 408.
Limestone other than dimension	120,595	24,100	--	All to Australia.
Sand other than metal-bearing	1,539	1,757	236	Hong Kong 605; Japan 512; United Kingdom 136.
Sulfur: Sulfuric acid	54	50	--	All to Guam.
Other:				
Crude	3,791	1,586	--	Singapore 459; India 67; Australia 36.
Slag and dross, not metal-bearing	153	1,198	--	Japan 1,018.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	784	49	11	Hong Kong 38.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	6,000	--	All to Guam.
Carbon: Carbon black	756	774	--	Sri Lanka 360; India 248; Thailand 72.
Coal: Anthracite and bituminous	--	6,800	--	Japan 1,800.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	46,539	350,796	--	Thailand 140,998; Bahamas 93,090; Hong Kong 50,889.
Gasoline, motor ——do——	716,448	785,324	--	Australia 381,998; Japan 216,334; Bermuda 186,992.
Distillate fuel oil ——do——	7,162	--		
Lubricants ——do——	12,229	29,722	--	Tanzania 14,189; Republic of Korea 5,614; Singapore 2,842.
Residual fuel oil ——do——	26,360	--		
Bitumen and other residues ——do——	24	--		
Tars and other crude chemicals derived from coal, gas, and petroleum	--	4	--	All to Nigeria.

[r] Revised. NA Not available.

[1] May include some platinum-group ore and concentrate.

Table 3.—Philippines: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Rare-earth metals	8	3	1	United Kingdom 1.
Aluminum:				
Ore and concentrate	8,219	12,592	2	Malaysia 12,590.
Oxides and hydroxides	1,202	1,394	176	Japan 880; China 150.
Metal including alloys:				
Scrap	68	222	179	West Germany 16; Singapore 15.
Unwrought	17,651	10,406	1,100	Australia 3,799; France 2,626; New Zealand 714.
Semimanufactures	5,426	4,446	332	Japan 1,917; West Germany 677; Sweden 438.
Chromium: Oxides and hydroxides	70	70	--	United Kingdom 27; Japan 11.
Cobalt: Oxides and hydroxides	2	5	--	Japan 4.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	--	$1	$1	
Copper:				
Matte and speiss including cement copper	--	5	--	All from Hong Kong.
Metal including alloys:				
Scrap	272	30	--	All from Japan.
Unwrought	4,961	5,733	--	Japan 4,509; Republic of Korea 367; Australia 326.
Semimanufactures	4,824	3,938	312	Japan 2,758; Australia 403; New Zealand 210.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite -- thousand tons	4,651	41	--	Japan 35.
Metal:				
Scrap	8,966	8,790	5,166	Japan 2,149; Australia 1,383.
Pig iron, cast iron, related materials	20,563	2,140	59	China 996; Japan 420; Sweden 324.
Ferroalloys:				
Ferromanganese	3,214	1,079	--	Republic of South Africa 337; China 148; Japan 136.
Unspecified	1,666	1,125	51	China 619; Canada 99; United Kingdom 91.
Steel, primary forms	479,630	372,534	--	Japan 100,329; China 89,613; Australia 83,037.
Semimanufactures:				
Bars, rods, angles, shapes, sections	70,114	62,127	242	Japan 36,605; Australia 9,361; Mozambique 3,885.
Universals, plates, sheets	279,013	291,006	12,780	Japan 192,917; Australia 22,953; France 9,986.
Hoop and strip	20,220	6,074	203	Japan 4,760; Australia 100; Republic of Korea 91.
Rails and accessories	6,001	2,891	46	Japan 2,539; Belgium-Luxembourg 130; Republic of Korea 69.
Wire	13,332	8,545	201	Japan 4,729; Republic of Korea 2,848; Australia 289.
Tubes, pipes, fittings	39,382	41,598	2,170	Japan 27,088; China 3,794; Spain 3,396.
Lead:				
Oxides	60	75	7	Australia 55; Japan 12.
Metal including alloys:				
Scrap	655	--		
Unwrought	5,422	7,019	541	Australia 5,396; Peru 350; Singapore 162.
Semimanufactures	357	217	4	Australia 55; West Germany 46; Belgium-Luxembourg 29.
Magnesium: Metal including alloys:				
Unwrought	6	36	26	Norway 10.
Semimanufactures	1	6	5	West Germany 1.
Manganese:				
Ore and concentrate	6,626	1,984	--	All from Singapore.
Oxides	1,365	1,331	30	Japan 797; Ireland 180; India 150.
Mercury value, thousands	$6	$72	$23	Japan $34; France $7.
Metalloids: Unspecified	17	38	(1)	Sweden 26; Japan 8.
Molybdenum: Metal including alloys, all forms	17	127	72	United Kingdom 51.
Nickel: Metal including alloys:				
Unwrought	83	75	4	Canada 22; Hong Kong 20; Japan 16.
Semimanufactures	107	43	2	Australia 18; West Germany 11.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$56	$19	$8	West Germany $11.

See footnotes at end of table.

Table 3.—Philippines: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought				
value, thousands	r$44	$77	$21	United Kingdom $29; West Germany $16; Japan $11.
Tin: Metal including alloys:				
Scrap	6	--	--	
Unwrought	437	6,339	4	Malaysia 6,159.
Semimanufactures	110	6	(1)	Japan 2; Singapore 1; United Kingdom 1.
Titanium: Oxides	1,322	1,162	86	Japan 264; Australia 202; United Kingdom 198.
Tungsten: Metal including alloys, all forms	96	26	2	Japan 18.
Zinc:				
Oxides	792	638	40	China 100; Australia 52; Mexico 18.
Metal including alloys:				
Scrap	20	--	--	
Unwrought	16,174	19,476	56	Japan 10,676; Canada 3,692; Australia 3,570.
Semimanufactures	653	417	224	Japan 148.
Other:				
Ores and concentrates	r1,081	1,055	--	Australia 744; China 250.
Oxides and hydroxides	295	279	39	Hong Kong 87; Japan 68.
Ashes and residues	38,366	54,336	--	All from Japan.
Base metals including alloys, all forms	654	282	8	Australia 206; China 38.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	485	661	90	Spain 176; China 157; Japan 135.
Artificial: Corundum	r130	3	1	Japan 2.
Dust and powder of precious and semiprecious stones				
value, thousands	$197	$187	--	Belgium-Luxembourg $186.
Grinding and polishing wheels and stones	1,094	900	77	Brazil 173; Japan 141; China 123.
Asbestos, crude	4,467	5,499	427	Canada 3,722; Australia 810; Republic of South Africa 333.
Barite and witherite	1,893	50	9	West Germany 41.
Boron materials: Oxides and acids	839	963	521	Hong Kong 404; China 37.
Cement	28,773	11,381	1,360	Japan 7,619; Singapore 1,085.
Chalk	215	119	--	All from Japan.
Clays and clay products:				
Crude, unspecified	31,227	45,027	17,884	Indonesia 8,623; Singapore 5,447; Republic of Korea 5,100.
Products:				
Nonrefractory				
value, thousands	$370	$655	$19	Italy $373; Japan $140.
Refractory including nonclay brick	$14,902	$12,010	$3,820	Japan $2,561; United Kingdom $1,188; Belgium-Luxembourg $1,020.
Cryolite and chiolite	--	1	NA	NA.
Diamond: Industrial				
value, thousands	$439	$593	$34	Belgium-Luxembourg $304; Australia $201; United Kingdom $40.
Diatomite and other infusorial earth	1,609	1,173	648	Japan 467; Australia 57.
Feldspar, fluorspar, related materials	3,022	5,176	72	Thailand 2,070; India 1,432; Japan 535.
Fertilizer materials: Manufactured:				
Ammonia	188,578	85,457	28,070	Kuwait 30,588; Indonesia 17,486; Qatar 9,312.
Nitrogenous	631,219	322,863	133,698	Republic of Korea 72,666; Japan 33,486; Belgium-Luxembourg 21,954.
Phosphatic	88,828	150,069	144,084	Republic of Korea 5,250; West Germany 735.
Potassic	135,475	88,976	3,747	China 79,171; West Germany 5,658.
Unspecified and mixed	16,731	61,564	20,140	Republic of Korea 35,949; Japan 5,100; West Germany 338.
Graphite, natural	184	177	18	China 80; Norway 32; Austria 17.
Gypsum and plaster	65,671	75,596	138	Japan 48,198; Australia 20,625; West Germany 6,531.
Halogens: Unspecified	--	2	(1)	Mainly from Japan.
Lime	758	291	284	Japan 7.
Magnesium compounds: Magnesite	6,856	3,198	10	Japan 1,853; China 1,150; Australia 142.

See footnotes at end of table.

Table 3.—Philippines: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Mica:				
Crude including splittings and waste	109	77	18	India 39; Switzerland 9.
Worked including agglomerated splittings	33	5	1	India 3.
Nitrates, crude	100	17	--	All from Belgium-Luxembourg.
Phosphates, crude	30,011	5	--	All from Japan.
Pigments, mineral: Iron oxides and hydroxides, processed	668	983	6	West Germany 645; Spain 180; Japan 95.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$12	$21	$11	Australia $10.
Synthetic do	$106	--		
Salt and brine	60,022	44,679	30	Australia 32,131; Mexico 5,400; West Germany 3,492.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxides including sodic and potassic peroxides	953	1,228	101	Japan 877; China 147.
Sodium carbonate, natural and manufactured	89,715	91,251	52,478	Japan 17,973; Kenya 8,500; Romania 7,000.
Sodium hydroxide	15,137	15,361	1,923	West Germany 4,158; Republic of Korea 3,016; Belgium-Luxembourg 1,766.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	279	302	--	Hong Kong 212; Singapore 22.
Worked	19	130	--	Hong Kong 88; Italy 17.
Dolomite, chiefly refractory-grade	5,305	3,397	--	Japan 888; United Kingdom 613; West Germany 598.
Gravel and crushed rock	268	487	10	France 395; Japan 60; Thailand 22.
Limestone other than dimension	459	503	2	Japan 361; Netherlands 38.
Quartz and quartzite	181	77	1	France 52; Netherlands 12.
Sand other than metal-bearing	16,878	26,641	8,981	Malaysia 16,400; Japan 599; Singapore 366.
Sulfur:				
Elemental:				
Crude including native and by-product	4,808	497	109	Australia 111; Belgium-Luxembourg 32; West Germany 27.
Colloidal, precipitated, sublimed	23,820	19,007	35	Canada 18,780.
Sulfuric acid	70,827	119,550	35	Japan 119,478.
Talc, steatite, soapstone, pyrophyllite	8,097	9,780	751	Republic of Korea 7,990; China 620; Japan 204.
Other:				
Crude	3,336	2,491	79	India 1,180; United Kingdom 718; Australia 286.
Slag and dross, not metal-bearing	50,638	90,707	6	Japan 90,627.
Oxides and hydroxides of barium, magnesium, strontium	813	476	117	Japan 160; Australia 72; United Kingdom 68.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	649	203	Japan 185; Spain 109; Hong Kong 52.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,020	972	4	China 650; Republic of Korea 300.
Carbon: Carbon black	1,132	1,939	315	Australia 600; China 480; Japan 398.
Coal:				
Anthracite and bituminous	2,422	12,705	464	Republic of Korea 6,137; Japan 5,980.
Lignite including briquets	--	241	227	Singapore 14.
Coke and semicoke	333,775	215,193	99,250	Japan 114,915; China 1,000.
Hydrogen, helium, rare gases	353	--		
Peat including briquets and litter	17	--		
Petroleum and refinery products:				
Crude				
thousand 42-gallon barrels	62,012	61,206	--	Saudi Arabia 31,453; Kuwait 6,741; Indonesia 5,383; China 4,286.
Refinery products:				
Liquefied petroleum gas do	633	1,127	(1)	Saudi Arabia 597; Australia 292; New Zealand 145.
Gasoline, motor do	322	40	(1)	Mainly from Italy.
Mineral jelly and wax do	56	104	5	China 59; Hong Kong 9; Japan 8.
Kerosine and jet fuel do	39	(2)	--	All from Japan.

See footnotes at end of table.

Table 3.—Philippines: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Distillate fuel oil thousand 42-gallon barrels	13,271	10,417	--	Kuwait 5,860; Bahrain 3,265; Singapore 931.
Lubricants ---------- do	113	135	99	Netherlands Antilles 14; Japan 6; Singapore 5.
Bitumen and other residues do	1	(1)	--	NA.
Bituminous mixtures do	3	3	1	China 1; Japan 1.
Petroleum coke ------ do	(1)	1	1	
Tars and other crude chemicals derived from coal, gas, and petroleum ------	5,399	5,385	411	Japan 1,489; Australia 1,070; China 650.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]Unreported quantity valued at $5,000.

COMMODITY REVIEW

METALS

Chromium.—Mine production of refractory and metallurgical chromite ore continued to decline. As a result of rising costs of electric power and weakening demand for the chromite by Japan and the United States, the output of refractory chromite dropped 23% to 107,434 tons for the first 6 months in 1982 from that of the same period in 1981. The output of metallurgical chromite ore and concentrate also dropped 22% to 67,358 tons for the first 6 months in 1982 from that of the same period in 1981.

Consolidated Mines Inc. (CMI) remained the dominant producer of refractory chromite ore, accounting for 87% of the output; followed by Philchrome Mining Corp., 11%; and Purdue Mining Co., 2%. Metallurgical chromite ore and concentrate was produced by Acoje Mining Co. Inc., accounting for 88% of the output followed by Malayan Wood Products Corp., 7%; and Velore Mining Corp., 5%.[3]

Trident Mining and Industrial Corp., the second largest producer of metallurgical chromite ore and concentrate in 1981, suspended mining and milling operations at Narra in Palawan. Despite the completion of its expansion program in February 1981, Trident Mining was not able to resume operations in 1982 because of financial difficulties.

Exports of chromite ore were 125,530 tons for the first 9 months in 1982 compared with about 220,000 tons for the same period in 1981. About 30% of chromite ore was exported to the United States, 26% to Japan, 19% to Sweden, and 25% to other destinations. Exports of metallurgical chromium concentrates were 64,223 tons for the first 9 months in 1982 compared with 77,000 tons for the same period in 1981. About 65% of the chromium concentrates was shipped to Japan and 35% to China.[4]

In April 1982, a low-silica chromite ore body was discovered by Benguet Corp., operator of the Masinloc Mine, which is owned by CMI. The new ore body is located near the Coto open pit in Masinloc, Zambales. According to company officials, the reserves of the low-silica chromite ore will be able to support an additional 10 years of mining in Masinloc.

Island Mining and Industrial Corp. was expected to start developing its metallurgical chromite deposit at Bicobian in northwestern Luzon in late 1982. The project was estimated to cost $230 million. According to plans, annual production will be 2 million tons, with a plant capacity of 150 tons per hour of ore. The plant was scheduled to come onstream in 1984. The reserves are estimated to be 48 to 50 million tons, averaging 48% Cr_2O_3.

The $32 million ferrochrome plant at the Phividec Industrial Estate of Tagoloan in Misamis Oriental Province on Mindanao Island was completed in 1982. Ferrochrome Philippines Inc., the owner and operator of the plant, is a joint venture of the Herdis Group Co. of the Philippines and Voest

Alpine AG of Austria. The plant has an annual capacity of 50,000 tons of ferrochrome and was expected to start operations in 1983.

Ferro-Chemicals Inc., the owner and operator of the country's first ferrochrome plant with an annual capacity of 12,000 tons, operated at full capacity. The plant is located in Manticao, Misamis Oriental Province on Mindanao Island, and has been in operation since 1976. Acoje Mining is the leading supplier of chromium concentrates for both Ferro-Chemicals and Ferrochrome Philippines.

Copper.—The Philippine copper industry suffered the worst year in its history in 1982. As a result of the prolonged low metal prices in the slumped world market and higher production costs, almost every primary copper producer posted a net loss from their copper operations. All of the top 10 primary producers cut their output in 1982 except MMIC and Lepanto. The substantial increase in copper production by MMIC was primarily due to the completion of its expansion program and the commissioning of a new generator, which allowed a higher mill throughput at its Sipalay Mine in Negros Occidental. However, Philippine copper production was down 6.5% for the first 10 months in 1982 from that of the same period in 1981.

According to the Chamber of Mines of the Philippines, production of copper by the top 10 primary producers during 1981-82 was as follows, in thousand tons of copper metal:

Company	1981	10 months	
		1981	1982
Atlas Consolidated Mining and Development Corp	139.0	116.6	110.4
Marcopper Mining Corp	36.3	31.2	30.4
Benguet Corp	28.1	23.4	21.1
Marinduque Mining and Industrial Corp	26.6	21.6	32.0
Philex Mining Corp	22.7	18.9	19.0
Lepanto Consolidated Mining Co. Inc	15.3	12.8	14.5
CDCP Mining Corp	12.2	9.8	6.0
Western Minolco Corp	9.8	8.5	.6
Baguio Gold Mining Co. Inc	5.1	4.4	--
Acoje Mining Co. Inc	2.6	2.2	--
Other primary and secondary producers	3.0	3.5	2.5
Total	300.7	252.9	236.5

Baguio Gold Mining Co. Inc. and Acoje Mining shut down their Santo Niño Mine in Tublay, Benguet, and Mabini Mine in Pangasinan, respectively, after suffering a series of heavy losses. For the same reason, Western Minolco Corp. shut down its Boneng copper operation at Atok in Benguet in March 1982, and CDCP Mining temporarily suspended its open pit operation at Basay, Negros Oriental, in April and July 1982.

Other primary copper producers that operated in 1982 were Hercules Minerals and Oil Inc. at Bully Bueno Mine in Marcos, Ilocos Norte, and Black Mountain Inc. at Kennon Mine in Benguet. Benguet Exploration Inc. was the only secondary copper producer that operated in 1982. The other secondary copper producer, Zambales Base Metals Inc., suspended operations indefinitely because of high production costs and low copper prices.

The copper mining industry, which had financial problems in 1981, had more serious difficulties in 1982 when the world copper price continued its downward trend early in the year. In an effort to assist the industry, the Government established a copper stabilization fund in May 1982 with initial capital of $24.5 million to help the distressed copper mining companies. However, the situation became more serious when the world market price of copper dropped further to about 60 cents per pound in late June 1982. Because of the importance of the copper industry to the Philippine economy (in terms of employment and export earnings), an executive order was issued by the President on July 3, 1982, for the state-owned NDC to rescue the copper producers.

According to the order, NDC was to purchase all copper concentrates produced by the industry from July 1 to December 31, 1982, at 75 cents per pound. If the world price fell below 75 cents per pound, the Government was to absorb the difference as a subsidy. All income above 75 cents per pound was to go to the Government.

Several financially troubled copper mining companies reportedly have taken the Government's offer. The two highest cost copper producers, Atlas Consolidated and Marcopper Mining, reportedly sold their copper to NDC during the second half of 1982.[5] The Government reportedly has appealed to Japan for a $120 million concession loan to help finance the copper subsidy program.[6] Despite this Government aid, Atlas Consolidated, the largest copper producer, was expected to lose about $41 million in 1982. Marcopper Mining and Lepanto, the other major copper producers, were expected to have combined losses of $13 million in 1982.

Because of the bleak future facing the copper industry, the Government tentative-

ly suspended development of the $75 million Hinobaan copper project in Negros Occidental in 1982. The project, originally scheduled to come onstream by 1984, was to have an initial mining capacity of 14,000 tons of ore per day. The project was also to supply about 1,200 tons of pyrite per day to the sulfuric acid plant of the Philippines Phosphate Fertilizer Corp. at Isabel City on Leyte Island. The Hinobaan project is a joint venture between NDC and Lepanto.

Construction work on the $250 million copper smelter at Isabel in southern Leyte was almost completed in 1982. The Philippines Associated Smelting and Refining Corp. (PASAR) planned to commence production in April or May 1983. The output is expected to be 110,000 tons in 1983. The 138,000-ton-per-year full capacity operation was planned for 1984. The smelter also was expected to produce 624,000 troy ounces of gold and silver mixed in doré bars in 1983 and 195,000 troy ounces of gold and 849,000 troy ounces of silver in doré bars in 1984.

The Japanese consortium of Marubeni, Sumitomo Corp., and C. Itoh & Co. Ltd. will distribute 105,000 tons per year of the smelter's output in the world market, except for Japan, in return for its $32 million equity investment in PASAR. The PASAR is 34.3% owned by NDC, 32% by the Japanese consortium, 5% by the International Finance Corp. (a subsidiary of the World Bank), and 28.7% by nine local copper producers. However, Western Minolco ($1.02 million), Black Mountain ($0.29 million), and Sabena Mining Corp. ($2.17 million) reportedly failed to subscribe for their share because of financial problems. Their shares were taken by NDC in late 1982.[7]

Gold.—Gold production increased slightly even though small gold mines and byproduct producers either cut back or shut down their operations. Higher mill recovery of gold from Dizon's Kaine concentrator of Benguet Corp. in Zambales and the Carmen and Biga concentrators of Atlas Consolidated in Toledo City, Cebu, contributed mostly to the increase in Philippine gold production in 1982.

Productivity improvements were also reported by Apex Exploration and Mining Co. Inc. at Apex-Masara Mine in Masara, Maco, Davao del Norte; by Lepanto at La Suerte Mine in Paracale, Camarines Norte; and by North Davao Mining Corp. at Hijo Gold Mine in Mabini, Davao del Norte, in 1982.

According to the Chamber of Mines of the Philippines, gold production of the top 10 companies during 1981-82 was as follows, in thousand troy ounces:

Company	1981	10 months	
		1981	1982
Benguet Corp. (primary and byproduct)	206.4	170.2	185.3
Atlas Consolidated Mining and Development Corp. (primary and byproduct)	194.0	161.6	162.5
Philex Mining Corp. (byproduct)	122.9	102.1	104.9
Lepanto Consolidated Mining Co. Inc. (byproduct)	61.4	52.3	65.2
Apex Exploration and Mining Co. Inc. (primary)	39.0	32.2	39.9
Marcopper Mining Corp. (byproduct)	30.1	26.2	29.1
Western Minolco Corp. (byproduct)	18.5	15.7	--
North Davao Mining Corp. (primary)	14.8	12.3	13.9
Vulcan Industrial and Mining Corp. (primary)	13.1	10.7	4.6
Benguet Exploration Inc. (primary)	12.0	10.0	11.8
Other (primary and byproduct)	40.3	31.4	27.8
Total	752.5	624.7	645.0

Other gold producers in 1982 were Itogon-Suyoc Mines Inc. (primary), Manila Mining Corp. (primary), and MMIC (byproduct). CDCP Mining (byproduct) and Black Mountain (byproduct) suspended operations for a few months while Western Minolco, Baguio Gold, and Sabena Mining (all byproduct) shut down mines in 1982.

The Batong Buhay Gold Mines Inc. copper-gold mine in Kalinga-Apayao of northern Luzon postponed commercial operations owing to an inadequate power supply. The transmission lines were expected to be installed by National Power to the minesite before the end of 1982. The project is owned by Batong Buhay but was to be operated by Philex under a management contract signed in 1980. The mine development cost was estimated to be $200 to $245 million, which made it one of the most expensive mining projects in the Philippines.

Iron and Steel.—Iron ore was produced by San Pio Quinto Mining Corp. and Construction Aggregate Producers Co. San Pio Quinto produced 5,746 tons of lump ore in Bulacan in 1981 and 4,785 tons for the first 6 months of 1982. Construction Aggregate Producers, which started mining magnetite sand in 1981, produced only 88 tons for 1981 and 50 tons for the first 6 months of 1982. According to the Philippines Bureau of Mines and Geo-Sciences, no exports of iron ore or concentrates were made during the past several years.

The Philippines Sinter Corp., a wholly owned subsidiary of Japan's Kawasaki Steel Corp., operated an iron sintering plant at the Phividec Industrial Estate in Misamis

Oriental, Mindanao. The complex, the largest of its kind in Southeast Asia, has a 5-million-ton-per-year-capacity sinter plant, a port, and an ore yard. The plant was commissioned in 1977 with an initial output of 3.7 million tons and was operating at near capacity during 1981-82. Exports of fluxed sinter (iron ore agglomerates) to Japan amounted to 3.6 to 4.2 million tons per year in 1981-82. About 4.6 million tons of required fine ore was imported mainly from Australia, Brazil, and Canada while about 350,000 tons of coke breeze was imported from Japan each year. However, about 480,000 tons of limestone per year was supplied by the company-owned quarry at Garcia-Hernandez on Bohol Island, about 150 kilometers by sea from the sinter plant.[8]

NASCO was expected to sign a $375 million contract with a Japanese consortium of Marubeni, Kawasaki Heavy Industries Ltd., Kobe Steel Ltd., and Ube Industries Ltd. in early 1983. The contract calls for the consortium to construct a direct-reduction plant, a pelletizing plant, and a limestone calcination kiln for a 1.4-million-ton-per-year steel mill in Iligan City of northern Mindanao. Six 230,000-ton-per-year direct-reduction furnaces reportedly will be provided by Kawasaki, an iron ore pelletizing plant by Kobe, and a sintering plant by Ube with a Japanese trade credit.

As part of NASCO's expansion program, $43 million worth of steelmaking equipment including electric arc furnaces and a continuous casting system was to be supplied by Davy McKee of Great Britain with British Government aid.[9]

Nickel.—Nickel production continued to decline in 1982 because of low nickel prices on the world metal market. MMIC's nickel metal production dropped drastically to 10,000 tons for the first 10 months of 1982 from about 20,000 tons for the same period of 1981. The nickel refinery on Nonoc Island, Surigao del Norte, which has a rated annual capacity of 34,000 tons, was operating at only 35% capacity in 1982 compared with 71% in 1981.

The nickel ore output of Rio Tuba Nickel Mining Corp. at Bataraza in southern Palawan Island, increased slightly to 307,200 tons of ore for the first 10 months of 1982 from 297,310 tons for the same period in 1981. The development cost of this mine, which started production in 1977, was estimated to be $28 million. It was financed by a Japanese consortium, which owned 40% of the company. The consortium, led by Pacific Metals Co. Ltd., is one of the major consumers of the nickel ore. Ore reserves of the Guitalunga deposit at Bataraza, Palawan, were estimated at 14.7 million tons averaging 2.3% nickel.

As a result of high production costs and the prolonged low metal prices of cobalt, copper, and nickel, MMIC, a major producer of these metals, was expected to lose about $200 million in 1982 compared with a loss of $113.8 million in 1981 and $36.5 million in 1980. According to the company's annual report for 1981, the interest charges alone amounted to 82% of the net loss for the year. The latest reports by the company indicated that the interest and other financial charges on the loan for the Nonoc refinery would amount to $164.7 million or about 82.4% of the net loss for 1982.[10]

NONMETALS

Cement.—In an effort to cut the energy cost of cement production, 17 cement plants were shifting from bunker oil to coal during 1981-82. Apo Cement Corp. in Naga City, Cebu; Bacnotan Consolidated Industrials Inc. in Bacnotan, La Union; and Pacific Cement Co. Inc. in Surigao, Surigao del Norte, have completed their conversions. Thirteen other cement plants were either converting or were to convert their fuel to coal in the next 3 years.

The first 1-million-ton-per-year-capacity cement plant, approved by the Philippines Board of Investments earlier in 1980, never got off the ground owing to the financial difficulties of CDCP Mining in 1981-82. The $100 million cement plant, to be built at Basay in Negros Oriental, was a joint venture between Philipp Bros. of the United States and CDCP Mining of the Philippines.

In August 1982, the Philippine Government reportedly decided to build another 1-million-ton-per-year-capacity cement plant in Semirara Island with financing from the U.S.S.R. This plant was proposed to be a joint venture between the state-owned NDC and the Government of the U.S.S.R. under a counter trade arrangement. However, the Philippine Government reportedly was seeking 100% financing by the U.S.S.R. Under the plan, the U.S.S.R. was to develop a coal mine in the Himalian area on Semirara Island and build a coal-fired, dry-process cement plant, port facilities, and a cement bag factory. In September, the U.S.S.R. reportedly was conducting a feasibility study on the cement plant.[11]

Fertilizer Materials.—In 1982, Polyphosphates Inc., a joint-venture company of Chemical Industries Corp. of the Philip-

pines and Albright & Wilson Ltd. of the United Kingdom, was established for construction of a $6.7 million phosphoric acid plant at Pasig, Rizal. Construction of the plant, with a capacity of 50,000 tons per year, was expected to begin in November 1982 and to be completed in September 1983. The plant was to be built by Power Gas of India, an affiliate of Davy McKee of the United Kingdom. Under the plan, 85% of the output was to be used as feedstock for manufacturing sodium tripolyphosphate. The phosphoric acid plant will be the first in the Philippines and the third and largest in Southeast Asia.[12]

MINERAL FUELS

Coal.—Because of the continuing drive for self-reliance in energy, the Philippine coal production continued its steep upward trend in 1982. Although coal output jumped 84% to 587,000 tons in 1982, it was 50% of capacity and 40% below the Government's target. There were about 25 coal mines operating mainly in the Cebu, Zamboanga del Sur, Semirara, and Polillo areas.

In mid-1982, Semirara Coal Corp., a subsidiary of Vulcan Industrial and Mining Corp., reportedly started its large-scale mine in the Caluya area on Semirara Island. The daily output capacity from the area's Unong deposit was estimated at 1,000 tons. According to the Government's latest estimate, coal reserves for the two coal deposits on Semirara Island were 75.8 million tons in the Panian area and 32.6 million tons in the Unong area. The combined coal reserves of these two areas represent 46% of the 233 million tons of proven reserves in the Philippines at the end of 1981.[13]

In June, a $17 million long-term loan was approved by the World Bank to finance the Government's $25 million coal exploration projects in Samar, eastern Mindanao, and southwestern Mindanao. The other $8 million will be financed by the Government and the Philippines National Oil Co. The exploration projects will be implemented by the Philippines National Oil Co.-Coal Corp. The World Bank loan was to support the expansion of the Philippine domestic coal supply within the shortest time through private sector development of promising coalfields.

Petroleum and Natural Gas.—The Philippines third offshore oilfield, Matinloc Oilfield, was inaugurated on July 21, 1982. Initial production was 13,000 barrels per day. However, according to industry sources, crude oil production at the Matinloc and Nido Oilfields was temporarily halted during August because of damages in production equipment caused by stormy weather and rough seas.

Philippine crude oil production from the three offshore oilfields totaled 21,000 barrels per day in the third quarter. By yearend, the crude output declined to 16,000 barrels per day, of which 2,000 barrels per day was from Nido Oilfield, 5,000 barrels per day from Cadlao Oilfield, and 9,000 barrels per day from Matinloc Oilfield. The decline was due to technical problems and water intrusion in the three producing oilfields.

A slowdown in oil exploration was reported as the budget dropped to $116 million in 1982 from $151 million in 1981. There were 17 wells scheduled for drilling by the Philippines Bureau of Energy Development for 1982 compared with an average of 30 per year in recent years. According to industry sources, the current oil glut, tight company budgets, and the limited success of exploration in the Philippines were the main reasons for the slowdown.[14]

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[1]Economist, Division of Foreign Data.

[2]Where appropriate, values have been converted from the Philippine peso (P) to U.S. dollars at the rate of P7.5115=US$1.00 in 1980, P7.8997=US$1.00 in 1981, and P8.5=US$1.00 in 1982.

[3]U.S. Embassy, Manila, Philippines. State Department Airgram A-45, Apr. 27, 1982, p. 5.

———. State Department Telegram 1542, Jan. 18, 1983.

[4]———. State Department Telegram 2694, Feb. 1, 1983.

[5]———. State Department Telegram 16721, July 9, 1982.

Metal Bulletin (London). No. 6707, July 23, 1982, p. 11.

[6]The Asian Wall Street Journal. V. 7, No. 59, Nov. 22, 1982, p. 1.

[7]The Chamber of Mines of the Philippines. Newsletter. V. 7, No. 11, November 1982, p. 1.

Metal Bulletin (London). No. 6739, Nov. 16, 1982, p. 11.

[8]Philippine Metal (Manila). V. 11, No. 3, July-September 1981, pp. 54-56.

[9]Bulletin Today (Manila). Feb. 8, 1983, p. 23.

American Metal Market. V. 91, No. 27, Feb. 8, 1983, p. 1.

[10]Mining Journal (London). Sept. 17, 1982, p. 205.

———. Jan. 7, 1983, p. 9.

[11]Bulletin Today (Manila). Aug. 5, 1982, p. 10.

Business Day (Manila). Apr. 6, 1983, p. 16.

[12]Bulletin Today (Manila). Apr. 5, 1982, p. 14.

The British Sulphur Corp. Ltd. Phosphorus and Potassium. No. 122, November-December 1982, p. 14.

[13]The Philippines Ministry of Energy, Bureau of Energy Development. Energy Resources Development in the Philippines. A Report of Activities During 1981. P. 25.

[14]Petroleum Economist. V. 44, No. 12, December 1982, p. 507.

The Mineral Industry of Poland

By Tatiana Karpinsky[1]

The recession in Poland ended in the first part of 1982, and since August, overall industrial production started to grow, especially in coal and copper mining. However, in 1982, national income decreased 8% and gross industrial production decreased by 2% compared with those of 1981. National income dropped more than 25% from 1979 to 1982. The slower decline in industrial output in 1982 was mainly due to an 11% increase in output in the mining sector. Hard coal production, which was placed under military control, increased 16% to over 189 million tons, owing to the introduction of a 6-day week and additional shifts. Reduced imports of raw materials and semimanufactured products resulted in the utilization of only 60% to 70% capacity in the manufacturing industries. Output declined significantly in the steel industry; however, output of nonferrous metals increased.

The country accounted for approximately 7% of world coal output, 4% of lignite production, 4% of copper, 2.2% of steel, and 8% of sulfur. The electrical and manufacturing industries contributed 23% to Poland's total industrial output. The fuel industry contributed 15%, an increase from 9% in 1981; the metallurgical industry, 8% (down from 9%); the chemical industry, 8%; and the mineral industry, 3.7%.

Poland's net debt to the West was about $25 billion,[2] approximately 45% of which was owed to commercial creditors, with the remainder owed to Western governments. In November, an agreement was reached with Western banks on restructuring that portion of the debt maturing in 1982, which was not backed by government guarantees. Of the total debt of $2.4 billion, 95% was payable over 7 years with a 4-year grace period. The remaining 5% was to be paid in two installments in 1983. Interest arrears totaling $1.1 billion were to be paid in three parts with the last part paid by March 20, 1983.

Principal events related to the mineral industry included the beginning of bituminous coal exploitation at the Bogdanka Mine in the Lublin coal basin and opening of new production levels at the Piast and Suszec Mines. Production also started in new lignite mines at Belchatow and at the Konin-Lubstow opencast mine. Three blocks were added to the power grid, two of 200 megawatts each at the Polaniec powerplant and one of 360 megawatts at the Belchatow plant. Among other projects put into operation was a 197,000-ton-per-year caustic soda lye plant at the nitrogen works at Wloclawek. Modernization of the Beirut plate mill and the Lenon cold mill was completed.

Government Policies and Programs.—Soon after the imposition of martial law in December 1981, which continued through 1982, state officials announced that the program of economic reforms prepared by the Government over the previous 12 to 18 months would be implemented on schedule. The economic reform was accordingly introduced on January 1, 1982. A number of regulations affecting changes in the economic planning and management system had been enacted in the last quarter of 1981, and a number of others were introduced in the first half of 1982. New Year's Day, 1982, was chosen as the official date for introducing economic reforms as a way of demonstrating decisiveness and of making a symbolic break with the past. The Government attached great significance to the economic reforms and planned to implement rapidly reforms that would result in a comprehensive change in the system of economic

planning and management. The main goal of the reform was to make the enterprises self-financing and to give the workers self-government. The 1983 National Annual Plan was ratified by the Council of Ministers on November 26, 1982. The major economic goal was to restore stability to the economy. Further adjustments were planned in industry with the aim of securing a modest recovery. To reduce dependence on imports, emphasis was placed on increasing domestic production and conserving raw materials, semimanufactured goods, and spare parts. The plan envisaged more rapid development of the infrastructure and gave priority to the development of rail and road transportation. In 1983, industrial production was planned to increase 4% and national income about 2.5% compared with those of 1982.

Table 1.—Poland: Planned mineral and energy production for 1983

(Million metric tons unless otherwise specified)

Commodity	1983	As percentage of 1982 production
Bituminous coal	186.0	98.3
Lignite	42.9	112.9
Coke	17.6	101.7
Petroleum products	13.5	102.3
Steel rolled products	11.4	110.1
Copper, thousand tons	350.0	100.5
Cement	17.2	106.8
Electric energy, billion kilowatt-hours	120.5	102.5

PRODUCTION

Coal and lignite production rose considerably compared with those of 1981.[3] Increases were also recorded in the production of electrolytic copper, lime, nitrogen compounds, phosphates, sulfur, and cement. However, production decreased for steel, coke, gas, oil refinery products, zinc, and aluminum. Electric energy production increased by 2.2% and reached 117.6 billion kilowatt-hours. The production of raw steel decreased. In 1982, 4.5 million persons were employed in industry, which was 243,000 less than in 1981. The number of workers and employees in state mineral and energy enterprises by branch for 1982 is given in table 2.[4]

Table 2.—Poland: Industrial workers and employees in 1982

Branch	Workers and employees (thousands)	Percent of total employment in all industry
Coal	435	9.7
Other fuel	51	1.1
Power	53	2.0
Ferrous metals	169	3.8
Nonferrous metals	65	1.5
Building materials	168	3.8

Table 3.—Poland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal, primary	100,000	96,600	95,100	66,000	42,700
Cadmium metal, primary	761	773	698	580	580
Copper:					
Mine output, metal content, recoverable	321,000	325,000	346,125	315,250	338,000
Metal:					
Smelter including secondary	337,000	341,000	363,500	330,770	351,000
Refined including secondary	332,200	335,800	357,300	327,210	[3]348,000
Iron and steel:					
Iron ore and concentrate, gross weight, thousand tons	529	249	104	105	[3]49
Pig iron, do.	11,109	10,966	11,600	9,350	[3]8,524
Ferroalloys:					
Blast furnace, do.	126	138	126	126	126
Electric furnace, do.	169	176	170	170	170
Steel:					
Crude, do.	19,251	19,218	19,485	15,719	[3]14,795
Semimanufactures:					
Rolled excluding pipe, do.	13,566	13,577	13,551	11,064	[3]10,478
Pipe, do.	1,164	1,161	1,132	1,043	[3]939

See footnotes at end of table.

Table 3.—Poland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Lead:					
Mine output, metal content, recoverable	63,900	61,900	60,040	50,434	57,495
Metal, smelter	86,700	84,200	82,000	69,000	[3]78,800
Nickel:[e]					
Mine output, metal content, recoverable	2,400	2,100	2,100	2,100	2,100
Metal, smelter	2,400	2,100	2,000	2,100	2,100
Silver, mine output, metal content, recoverable thousand troy ounces	21,900	22,600	24,665	20,576	[3]21,058
Zinc:					
Mine output, metal content	194,000	182,700	187,800	146,484	145,000
Metal, refined, including secondary	222,000	209,000	215,300	167,100	[3]165,400
NONMETALS					
Barite	90,300	96,000	96,300	85,300	80,000
Cement, hydraulic thousand tons	21,700	19,176	18,443	14,226	16,100
Clays and clay products:					
Crude:					
Bentonite[e] do	50	50	50	50	70
Fire clay do	1,292	1,251	1,200	1,200	1,200
Kaolin do	66	49	51	43	45
Products do	768	687	600	600	600
Feldspar[e] do	40	40	40	82	80
Gypsum and anhydrite, crude[e 4] do	1,350	1,360	1,300	1,300	1,300
Lime, hydrated and quicklime do	9,135	7,652	7,500	7,500	7,500
Magnesite, crude	23,700	20,000	19,600	11,300	11,300
Nitrogen: N content of ammonia thousand tons	1,611	1,525	1,543	1,389	[3]1,423
Salt:					
Rock do	1,435	1,458	1,465	1,313	1,400
Other do	2,958	2,971	3,069	2,958	2,900
Sodium and potassium compounds, n.e.s.:					
Sodium carbonate (soda ash) do	663	684	762	701	700
Caustic soda (96% NaOH) do	489	454	433	417	367
Stone:					
Dolomite do	3,118	3,296	3,437	3,070	3,100
Limestone do	NA	NA	60,877	50,000	NA
Quartzite do	NA	NA	NA	NA	NA
Other do	17,476	17,610	16,000	16,000	NA
Sulfur:					
Native:					
Frasch[e] do	4,546	4,310	4,667	4,295	4,428
Other than Frasch[e] do	505	520	518	478	492
Total do	5,051	4,830	5,185	4,773	[3]4,920
Byproduct:[e]					
From metallurgy do	315	310	300	300	300
From petroleum do	35	35	30	30	30
Total do	350	345	330	330	330
From gypsum[e] do	20	20	20	20	20
Grand total sulfur do	5,421	5,195	5,535	5,123	5,270
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous do	192,622	201,004	193,121	163,022	[3]189,300
Lignite and brown do	41,005	38,083	36,866	35,600	[3]37,600
Total do	233,627	239,087	229,987	198,622	[3]226,900
Coke:					
Coke oven do	[r]19,429	[r]19,324	19,244	17,346	17,300
Gashouse do	950	950	940	573	600
Total do	[r]20,379	[r]20,274	20,184	17,919	17,900
Fuel briquets, all grades do	1,752	1,800	1,700	1,200	1,200
Gas:					
Manufactured:					
Town gas million cubic feet	16,282	14,233	14,000	11,763	11,500
Coke oven gas do	265,359	261,015	250,000	229,546	200,000
Natural, marketed do	282,242	259,072	223,501	205,248	[3]195,370
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	[e]85	[e]85	80	80	80
Propane and butane do	[e]58	[e]58	53	53	53
Peat: Fuel and agricultural	200,000	200,000	202,700	201,645	200,000

See footnotes at end of table.

Table 3.—Poland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products:					
Crude:					
As reported ____ thousand tons	363	331	329	315	315
Converted ____ thousand 42-gallon barrels	2,693	2,456	2,441	2,337	2,337
Refinery products:					
Gasoline ____ do	29,325	28,720	28,330	27,044	27,044
Kerosine (presumably including jet fuel) ____ do	1,240	1,105	1,744	1,615	1,615
Distillate fuel oil ____ do	39,240	38,663	37,994	36,227	36,227
Residual fuel oil ____ do	29,970	29,826	26,180	24,925	24,925
Lubricating oil and grease ____ do	3,430	3,314	[e]3,150	3,027	3,027
Paraffin ____ do	197	--	180	168	NA
Liquefied petroleum gas ____ do	2,320	2,209	[e]2,100	2,018	2,018
Bitumen ____ do	7,090	6,628	[e]6,300	6,054	6,054
Total[5] ____ do	112,812	110,465	105,978	101,078	100,910

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through July 1, 1983.

[2]In addition to the commodities listed, antimony, cobalt, germanium, gold, a variety of crude nonmetallic construction materials, and carbon black are also produced, but available information is inadequate to make reliable estimates of output levels. Poland may also produce alumina in small quantities, but details of such an operation, if it exists, are not available.

[3]Reported figure.

[4]Includes building gypsum, as well as an estimate for gypsum used in production of cement.

[5]Total of listed commodities only; excludes products not reported individually as well as refinery fuel and losses.

TRADE

In 1982, despite a stagnation in exports to the West, a trade surplus was achieved for the first time in 13 years. Exports to centrally planned economy countries were increased 24%, and imports from developed market economy countries were reduced by 26%, which was the same amount as in 1981. Purchases from the developing countries decreased by 34%. Raw materials, semimanufactured products, and spare parts accounted for 78% of total imports in 1982. The composition of exports also changed, with the share of fuels and energy rising in 1982. Sales of bituminous coal rose by 88% to 28.5 million tons.

Table 4.—Poland: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	51	17	--	All to Norway.
Ash and residue containing aluminum	NA	4,413	--	All to West Germany.
Metal including alloys:				
Scrap	7,489	4,034	--	Austria 3,277; West Germany 597; France 107.
Unwrought	17,095	1,696	--	Hungary 1,600; Sweden 83.
Semimanufactures	143	54	21	Sweden 21; Austria 5; West Germany 3.
Chromium: Oxides and hydroxides	[r]533	243	98	Sweden 60; Finland 55; Switzerland 15.
Columbium and tantalum: Metal including alloys, all forms, tantalum	3	NA		
Copper:				
Ore and concentrate	--	4,008	--	All to Finland.

See footnotes at end of table.

Table 4.—Poland: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Copper —Continued				
Sulfate	--	100	--	All to Finland.
Ash and residue containing copper	NA	767	--	All to West Germany.
Metal including alloys:				
Scrap	511	617	--	France 338; West Germany 153; United Kingdom 66.
Unwrought[2]	144,754	142,514	--	West Germany 72,369; United Kingdom 24,172; Belgium-Luxembourg 13,215.
Semimanufactures[2]	50,056	45,327	3,142	Czechoslovakia 19,725; Romania 6,279; U.S.S.R. 4,788.
Iron and steel:				
Iron ore and concentrate, including roasted pyrite	11,481	NA		
Metal:				
Scrap	14,944	[2]79,787	--	Yugoslavia 29,012;[2] West Germany 22,855;[2] Sweden 15,794.[2]
Pig iron, cast iron, related materials	10,589	20	--	All to United Kingdom.
Ferroalloys: Unspecified	101	NA		
Steel, primary forms thousand tons	215	116	--	Yugoslavia 51; Austria 27; West Germany 11.
Semimanufactures:[3]				
Bars, rods, angles, shapes, sections do	1,053	844	--	West Germany 140; Yugoslavia 33; Egypt 25.
Universals, plates, sheets do	386	381	98	West Germany 61; Yugoslavia 25; Bulgaria 23.
Hoop and strip do	168	183	--	Yugoslavia 36; Sweden 22; undetermined 110.
Rails and accessories do	133	147	--	NA.
Wire do	52	37	1	Libya 4; Hungary 3; Yugoslavia 2; undetermined 23.
Tubes, pipes, fittings do	115	95	9	East Germany 29; West Germany 6; France 5.
Castings and forgings, rough do	11	4	--	Mainly to West Germany.
Lead:				
Oxides	40	NA		
Ash and residue containing lead	NA	374	--	All to West Germany.
Magnesium: Metal including alloys, semimanufactures	--	1	1	
Metalloids: Silicon	--	1	--	Mainly to Japan.
Molybdenum: Metal including alloys, all forms	4	(4)	--	All to Morocco.
Nickel: Metal including alloys:				
Scrap	18	22	--	Finland 18.
Semimanufactures	1	8	--	All to France.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$1,428	$3	--	All to Sweden.
Silver:				
Waste and sweepings do	$450	$39	--	All to West Germany.
Metal including alloys, unwrought and partly wrought[2]	516	397	108	United Kingdom 138; Belgium-Luxembourg 56; West Germany 56.
Tin:				
Ash and residue containing tin	NA	371	--	Netherlands 327; West Germany 44.
Metal including alloys:				
Scrap	36	150	--	United Kingdom 107; West Germany 43.
Unwrought	--	1	--	All to Italy.
Titanium: Oxides	--	36	--	Italy 18; Japan 18.
Tungsten: Metal including alloys, all forms	6	19	16	West Germany 2.
Zinc: Metal including alloys:[2]				
Unwrought	41,408	22,161	600	United Kingdom 9,686; Hungary 7,764; Sweden 1,868.
Semimanufactures	4,699	4,870	74	U.S.S.R. 1,801; Czechoslovakia 1,449; West Germany 919.
Other:				
Oxides and hydroxides	11	(4)	--	All to Switzerland.
Ashes and residues	13,493	4,382	--	Austria 4,123; Italy 194.
Nonferroalloys[2]	4,000	--		
Metal powder[2]	887	--		

See footnotes at end of table.

Table 4.—Poland: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Other —Continued				
Base metals including alloys, all forms	1	4	--	Finland 2; West Germany 2.
NONMETALS				
Abrasives, n.e.s.:				
Artificial:				
Corundum	[r]3,699	1,610	--	Austria 880; West Germany 501; Italy 191.
Silicon carbide	NA	1,768	--	France 1,366; Norway 250; West Germany 89.
Grinding and polishing wheels and stones[5]	[r]317	168	(6)	Pakistan 85; Thailand 22; Austria 19.
Asbestos, crude	--	36	--	All to Italy.
Cement[2] thousand tons	1,890	511	--	West Germany 133; Austria 123; Sweden 121.
Chalk	15	5	--	All to Libya.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	NA	6,117	--	Austria 5,718; Spain 399.
Chamotte earth[2]	10,203	7,289	--	Yugoslavia 4,870; Hungary 1,164; Italy 591.
Fire clay[2]	21,631	19,752	--	Hungary 14,034; Austria 5,634.
Unspecified	496	NA		
Products:				
Nonrefractory	4,463	4,731	--	Sweden 2,905; Finland 1,073; West Germany 605.
Refractory including nonclay brick[2]	17,790	19,721	130	Finland 5,680; Czechoslovakia 4,332; Belgium-Luxembourg 3,847.
Diamond:				
Gem, not set or strung value, thousands	--	$106	--	All to Belgium-Luxembourg.
Industrial do	$593	$316	--	Do.
Diatomite and other infusorial earth	--	(4)	--	All to Switzerland.
Fertilizer materials:				
Crude, n.e.s	--	40	--	All to West Germany.
Manufactured:				
Ammonia	12,063	NA		
Nitrogenous[2]	[r]275,143	27,875	--	West Germany 15,809; Sweden 4,000.
Phosphatic	110	NA		
Potassic[2]	[r]14,495	--		
Unspecified and mixed	39,707	304	--	West Germany 280.
Graphite, natural	87	NA		
Gypsum and plaster	--	17	--	All to Denmark.
Halogens:				
Chlorine	NA	36,041	--	All to West Germany.
Iodine	2	NA		
Unspecified	1	2,927	--	All to Belgium-Luxembourg.
Lime[2]	12,212	13,467	--	Hungary 10,649; Denmark 1,166.
Magnesium compounds: Magnesite	41	18	--	All to Thailand.
Nitrates, crude	--	36	--	All to Portugal.
Pigments, mineral: Iron oxides and hydroxides, processed	20	20	--	All to Italy.
Precious and semiprecious stones other than diamond: Natural value, thousands	$14	$2	$1	All to Switzerland.
Pyrite, unroasted	--	440	--	All to Egypt.
Salt and brine[2]	296,711	240,966	--	Sweden 105,598; Finland 90,220; France 23,002.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1	6	--	Italy 5.
Sodium carbonate, natural and manufactured[2]	141,481	125,084	--	West Germany 36,535; U.S.S.R. 23,924; Czechoslovakia 21,354.
Sodium hydroxide[2]	43,017	65,297	1	Netherlands 16,567; Yugoslavia 6,541; West Germany 5,731.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	[r]19,147	12,172	--	Netherlands 7,939; Belgium-Luxembourg 3,596; Hungary 502.
Worked	[r]20,038	13,623	(7)	West Germany 5,940; Sweden 1,776; Denmark 1,728.
Dolomite, chiefly refractory-grade	11	NA		
Gravel and crushed rock[2]	291,543	302,547	--	West Germany 298,159.
Limestone other than dimension	3,275	636	--	All to Sweden.
Sand other than metal-bearing	196,422	168,943	--	All to West Germany.
Sulfur:				
Elemental:				
Crude including native and byproduct[2] thousand tons	3,903	3,817	--	U.S.S.R. 792; Czechoslovakia 458; France 357.

See footnotes at end of table.

Table 4.—Poland: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur —Continued				
Elemental —Continued				
Colloidal, precipitated, sublimed	[r]872	4,719	--	Sweden 4,347; Yugoslavia 160; Singapore 110.
Sulfuric acid[2]	211,729	115,088	--	U.S.S.R. 79,921; Finland 20,521; Switzerland 12,374.
Other:				
Crude	36	4,378	--	West Germany 4,215; Austria 162.
Slag and dross, not metal-bearing	1,907	13,801	--	West Germany 13,213; Austria 573.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	233	--	France 120; Finland 36; Libya 32.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	192	1	--	All to West Germany.
Coal:				
Anthracite and bituminous[2] thousand tons	31,048	15,159	28	U.S.S.R. 3,834; Finland 1,422; East Germany 1,185.
Briquets of anthracite and bituminous coal	[r]263	2,746	--	Denmark 2,719.
Lignite including briquets[2] thousand tons	1,569	1,383	--	East Germany 1,146; West Germany 237.
Coke and semicoke[2] do.	1,770	1,515	--	U.S.S.R. 705; Austria 224; East Germany 149.
Hydrogen, helium, rare gases million cubic feet	--	34,608	--	Austria 11,901; West Germany 11,760; France 10,947.
Peat including briquets and litter[2]	17,394	8,695	--	Austria 2,572; Yugoslavia 2,450; West Germany 2,339.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	551	19	--	West Germany 9; Yugoslavia 5; Denmark 3.
Gasoline do.	757	306	--	Switzerland 131; Sweden 129; Denmark 27.
Mineral jelly and wax do.	3	6	--	All to Netherlands.
Kerosine and jet fuel do.	15	17	--	All to Hungary.
Distillate fuel oil do.	4,870	3,026	--	West Germany 995; Sweden 544; Denmark 449.
Lubricants do.	57	47	--	France 18; Austria 17; Yugoslavia 11.
Residual fuel oil do.	1,183	315	--	Austria 273; Sweden 36.
Bitumen and other residues do.	--	(4)	--	All to Bahrain.
Bituminous mixtures do.	(4)	(4)	--	All to Finland.
Petroleum coke do.	--	(4)	--	All to Belgium-Luxembourg.
Unspecified[2] do.	4,424	2,352	--	NA.
Tars and other crude chemicals derived from coal, gas, and petroleum	[r]63,443	56,645	3	West Germany 31,584; Finland 10,547; France 9,629.

[p]Preliminary. [r]Revised. NA Not available.

[1]Owing to a lack of official trade data published by Poland, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information, data published by the partner trade countries, and partial official trade sources of Poland.

[2]Official trade statistics of Poland.

[3]For total trade only: Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[4]Less than 1/2 unit.

[5]Excludes imports by Hungary valued at $7,000 in 1980 and $108,000 in 1981.

[6]U.S. imports were valued at $33,000.

[7]U.S. imports were valued at $26,000.

Table 5.—Poland: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	61	29	--	United Kingdom 15; Austria 11.
Aluminum:				
Ore and concentrate[2]	83,146	39,436	--	Hungary 30,070; Australia 9,366.
Oxides and hydroxides[2]	287,206	240,400	40	Yugoslavia 81,789; Hungary 78,555; Switzerland 51,748.
Metal including alloys:				
Unwrought	19,825	11,898	--	Hungary 8,844; France 3,011.
Semimanufactures[2]	25,600	14,141	(3)	U.S.S.R. 5,784; East Germany 1,594; Romania 1,000.
Antimony: Metal including alloys, all forms	--	202	--	All from Belgium-Luxembourg.
Bismuth: Metal including alloys, all forms	34	29	--	All from Japan.
Chromium:				
Ore and concentrate[2]	197,975	181,902	--	U.S.S.R. 133,270; Albania 20,480; Turkey 17,916.
Oxides and hydroxides	9	(3)	--	All from France.
Cobalt:				
Oxides and hydroxides	--	5	--	All from United Kingdom.
Metal including alloys, all forms	16	24	--	France 20; West Germany 4.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium) kilograms	321	166	--	All from West Germany.
Tantalum do	89	NA		
Copper: Metal including alloys:				
Scrap	19	NA		
Unwrought	15	3,609	--	Peru 3,503;[4] Norway 98.
Semimanufactures[2]	1,873	780	3	West Germany 236; U.S.S.R. 211; Yugoslavia 84.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	68	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	20,150	15,870	--	U.S.S.R. 13,428; Brazil 1,938; Norway 299.
Metal:				
Scrap do	[5]227	[2]51	--	All from U.S.S.R.
Pig iron, cast iron, related materials do	[5]1,430	[5]1,449	--	Mainly from U.S.S.R.
Ferroalloys:				
Ferrochromium do	NA	1	--	All from Yugoslavia.
Ferromolybdenum do	NA	(3)	--	All from Sweden.
Ferrosilicon do	NA	12	--	Yugoslavia 7; Norway 5.
Unspecified[5] do	71	53	(3)	NA.
Steel, primary forms do	[5]12	[5]15	--	Mainly from Yugoslavia.
Semimanufactures:[5]				
Bars, rods, angles, shapes, sections do	447	410	(3)	West Germany 14; Hungary 14; undetermined 361.
Universals, plates, sheets do	846	695	--	Czechoslovakia 92; West Germany 30; undetermined 547.
Hoop and strip do	61	24	(3)	West Germany 10; Yugoslavia 7; Italy 2.
Rails and accessories do	9	16	--	NA.
Wire do	44	27	--	Belgium-Luxembourg 2; West Germany 2; undetermined 19.
Tubes, pipes, fittings do	258	205	(3)	Romania 55;[2] East Germany 26;[2] Yugoslavia 20.[2]
Castings and forgings, rough do	33	22	--	Czechoslovakia 10;[2] East Germany 9.[2]
Lead:				
Oxides	787	463	--	Austria 405; France 58.
Metal including alloys:				
Unwrought	6,654	3,060	--	All from United Kingdom.
Semimanufactures	1	91	--	All from West Germany.
Magnesium: Metal including alloys:				
Unwrought[2]	1,127	1,079	--	Norway 320; Yugoslavia 309; United Kingdom 286.
Semimanufactures	160	1	--	All from West Germany.
Manganese:				
Ore and concentrate, metallurgical-grade[2]	664,187	583,207	--	U.S.S.R. 495,426; Brazil 47,002; France 40,779.
Oxides	1,015	253	13	Greece 100; Ireland 100; France 40.
Metal including alloys, all forms	65	NA		
Mercury 76-pound flasks	377	NA		
Metalloids:				
Phosphorus	NA	10,360	--	All from U.S.S.R.
Selenium	NA	14	--	All from Japan.
Silicon	NA	3,351	--	Yugoslavia 2,711; Norway 640.
Unspecified	22,018	16,084	3	France 16,030.
Molybdenum:				
Ore and concentrate	83	NA		

See footnotes at end of table.

Table 5.—Poland: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Molybdenum —Continued				
Metal including alloys, all forms	--	5	--	All from Switzerland.
Nickel: Metal including alloys:				
Unwrought	89	(3)	--	All from West Germany.
Semimanufactures	47	206	2	Italy 195; West Germany 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$695	$476	--	United Kingdom $431; West Germany $44.
Silver: Metal including alloys, unwrought and partly wrought do	$2,068	$744	--	France $692; West Germany $41.
Tin:				
Oxides	18	NA		
Metal including alloys:				
Unwrought[2]	3,318	2,223	--	United Kingdom 1,206; Belgium-Luxembourg 697; Indonesia 299.
Semimanufactures	2	3	(3)	All from West Germany.
Titanium:				
Ore and concentrate	--	500	--	Do.
Oxides	723	575	--	West Germany 311; United Kingdom 263.
Metal including alloys, all forms kilograms	678	NA		
Tungsten:				
Ore and concentrate[2]	1,662	806	--	All from China.
Metal including alloys, all forms	4	62	--	West Germany 59.
Zinc:				
Ore and concentrate[2]	27,053	NA		
Oxides	5	NA		
Metal including alloys:				
Unwrought[2]	2,398	4,116	--	All from U.S.S.R.
Semimanufactures	266	NA		
Zirconium: Ore and concentrate	--	6	--	All from Belgium-Luxembourg.
Other:				
Ores and concentrates	[6]84,237	48,073	--	Norway 48,040.
Oxides and hydroxides	324	2,279	--	Sweden 1,709; Austria 405; West Germany 124.
Ashes and residues	9	1,783	--	Sweden 1,559; West Germany 220.
Nonferrous alloys[2]	3,114	1,764	--	U.S.S.R. 953; Hungary 606; East Germany 205.
Metal powder[2]	777	157	--	All from U.S.S.R.
Base metals including alloys, all forms	116	228	2	Belgium-Luxembourg 204; Austria 12; West Germany 10.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	767	(3)	--	All from West Germany.
Artificial: Corundum	1,810	1,022	125	Yugoslavia 650; Italy 244.
Dust and powder of precious and semi-precious stones value, thousands	$230	NA		
Grinding and polishing wheels and stones[7]	1,673	884	1	Austria 296; Yugoslavia 216; West Germany 167.
Asbestos, crude[2]	83,272	79,837	--	U.S.S.R. 77,850; Switzerland 763; Italy 618.
Barite and witherite	4,088	NA		
Boron materials:				
Crude natural borates	[r]20,020	NA		
Oxides and acids	[r]2,105	906	--	France 905.
Cement[2]	134,970	88,509	5	U.S.S.R. 58,119; Hungary 18,648; Czechoslovakia 11,732.
Chalk	40	NA		
Clays and clay products:				
Crude:				
Bentonite	4,591	5,021	30	All from Hungary.
Chamotte earth[2]	81,089	21,677	--	France 14,917; West Germany 5,103.
Dinas earth	--	119	--	All from Austria.
Fire clay[2]	11,380	6,199	--	U.S.S.R. 5,861.
Kaolin[2]	151,252	139,379	--	Czechoslovakia 65,012; United Kingdom 44,584; U.S.S.R. 17,362.
Unspecified	1,145	87	87	
Products:				
Nonrefractory	15,186	9,530	--	Italy 5,211; Spain 3,801; Portugal 376.
Refractory including nonclay brick[2]	34,771	21,717	--	Czechoslovakia 8,086; Yugoslavia 2,619; Austria 2,408.
Diamond:				
Gem, not set or strung value, thousands	--	$5	--	Belgium-Luxembourg $4.
Industrial do	$3,579	$582	--	Belgium-Luxembourg $436; United Kingdom $142.
Diatomite and other infusorial earth	3,480	2,135	2,110	West Germany 24.

See footnotes at end of table.

Table 5.—Poland: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Feldspar, fluorspar, related materials:				
Feldspar	--	7,241	--	All from Norway.
Unspecified[2]	55,328	24,005	--	Mexico 14,314; East Germany 9,636.
Fertilizer materials: Manufactured:				
Ammonia[2]	33,705	114,904	--	U.S.S.R. 114,293.
Nitrogenous[2] thousand tons	123	156	--	U.S.S.R. 136; Czechoslovakia 10; Hungary 10.
Potassic[2] do	2,428	2,865	--	U.S.S.R. 2,262; East Germany 574.
Unspecified and mixed	--	25	--	All from West Germany.
Graphite, natural[2]	11,386	7,972	--	Austria 6,582; U.S.S.R. 555; Czechoslovakia 540.
Gypsum and plaster	6,324	11,594	--	France 6,200; West Germany 5,379.
Halogens:				
Chlorine	--	55	--	All from France.
Unspecified	94	26	--	All from United Kingdom.
Lime	42	52	--	Austria 42; France 10.
Magnesium compounds:				
Magnesite[2]	317,120	223,004	--	North Korea 69,588; Brazil 65,645; Czechoslovakia 64,807.
Oxides and hydroxides	NA	185	--	All from France.
Other	NA	4,578	--	All from Austria.
Mica:				
Crude including splittings and waste[2]	1,844	1,442	--	India 1,417.
Worked including agglomerated splittings	56	26	--	United Kingdom 9; Austria 7; Switzerland 6.
Phosphates, crude[2] thousand tons	3,242	2,938	188	Morocco 1,301; U.S.S.R. 857; Jordan 289.
Pigments, mineral: Iron oxides and hydroxides, processed	2,419	830	(3)	West Germany 565; Belgium-Luxembourg 173.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$65	$3	--	All from West Germany.
Synthetic do	$81	$26	--	West Germany $15; Japan $8.
Pyrite, unroasted	20	20	--	All from Italy.
Salt and brine	7	27	--	Italy 24.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	[8]200	214	--	Belgium-Luxembourg 199; Denmark 13.
Sodium hydroxide	[2]4,289	27	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[2]	4,842	2,118	--	Hungary 1,107; Bulgaria 1,011.
Worked	1,748	NA		
Dolomite, chiefly refractory-grade	110	NA		
Gravel and crushed rock[2]	13,786	10,151	--	Norway 7,092; Finland 3,059.
Quartz and quartzite	5,543	2,854	--	West Germany 2,530; Finland 130; Sweden 130.
Sand other than metal-bearing	132	9	--	Sweden 8.
Sulfur:				
Elemental, crude including native and byproduct	25	NA	--	
Sulfuric acid	13	251	--	Netherlands 200; Belgium-Luxembourg 50.
Talc, steatite, soapstone, pyrophyllite[2]	23,180	12,818	--	Czechoslovakia 6,350; North Korea 3,883; Austria 1,400.
Other:				
Crude	15,351	15,474	--	Hungary 15,165; West Germany 211.
Oxides and hydroxides of barium, magnesium, strontium	10,504	2	--	All from West Germany.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	81,950	(9)	U.S.S.R. 65,330;[2] Czechoslovakia 13,555.[2]
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	153	NA		
Carbon: Carbon black[2]	33,656	21,469	172	U.S.S.R. 5,009; West Germany 2,505; France 1,847.
Coal:				
Anthracite[2] thousand tons	30	31	--	All from U.S.S.R.
Bituminous[2] do	1,012	1,072	--	U.S.S.R. 772; East Germany 300.
Lignite including briquets	--	20	--	All from Yugoslavia.
Coke and semicoke	450	NA		
Gas, natural[2] million cubic feet	187,591	185,791	--	All from U.S.S.R.
Hydrogen, helium, rare gases do	--	36	--	All from Netherlands.
Peat including briquets and litter	--	23	--	All from Sweden.

See footnotes at end of table.

Table 5.—Poland: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products:[2]				
Crude ___ thousand 42-gallon barrels__	120,382	99,299	--	U.S.S.R. 96,292; Iran 3,007.
Refinery products, unspecified___do____	33,168	29,585	(3)	U.S.S.R. 21,829; Romania 429; Albania 361.
Tars and other crude chemicals derived from coal, gas, and petroleum _____	2,395	278	--	France 143; Belgium-Luxembourg 89; United Kingdom 24.

[p]Preliminary. [r]Revised. NA Not available.

[1]Owing to a lack of official trade data published by Poland, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information, data published by the partner trade countries, and partial official trade sources of Poland.

[2]Official trade statistics of Poland.

[3]Less than 1/2 unit.

[4]World Metal Statistics, published by World Bureau of Metal Statistics, London, United Kingdom.

[5]For total trade only: Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York.

[6]Excludes exports from Australia valued at $788,000.

[7]Excludes quantity valued at $41,000 in 1980 and $186,000 in 1981.

[8]Statistical Yearbook of Members of the Council for Mutal Economic Assistance, Moscow, U.S.S.R.

[9]U.S. exports were valued at $20,000.

COMMODITY REVIEW

METALS

Aluminum.—Production of aluminum was stabilized in the 1970's at an annual level of 100,000 tons. The decline to 66,000 tons in 1981 was due to a decrease in production capacities owing to the shutdown of the metallurgical plant in Konin, which was inadequately supplied with imported alumina and energy. In 1982, aluminum production further declined; demand in the country was 180,000 tons and was met by importing alumina and aluminum mainly from market economy countries and the U.S.S.R.

Copper.—Miners and metallurgy workers from the Lubin copper basin fulfilled the 1982 plan. The output of electrolytic copper was similar to the level achieved in 1980. The copper industry again attained stability. Copper ore was extracted from the Lubin, Polkawice, and Rudna underground mines, with a small amount from the Sieroszowice Mine, which was under development, and from two small, old mines.

Electrolytic copper was an important export item and, as a source of currency, was second to coal among mineral exports. Exports of copper reached 184,000 tons and were more than 10% higher than in 1981. The value of copper exported reached $250 million, and the value of silver obtained as a byproduct in copper production was $100 million. Most of the exported copper was delivered within the framework of long-term contracts; about 60% of copper exports were directed to the Federal Republic of Germany, and the rest, to Belgium, the United Kingdom, Italy, and Switzerland. Polish exports of copper semimanufactures reached about 40,000 tons in 1982, and about 75% of these exports was directed to centrally planned economy countries, and 25%, to developed market economy countries.

Iron and Steel.—Poland faced a further decline in steel output. The main reason for the decline was lack of foreign exchange needed to buy imported raw materials. The U.S.S.R. supplied Poland with iron ore, manganese, chrome, pig iron, and ferroalloys. Construction of a coke oven battery at Kotawice went ahead, along with expansion of the rolling mill. Domestic iron ore production was insignificant. Only one small mine was in operation, producing 38,000 tons per year of siderite ore. Imports of crude iron ore and concentrate totaled 13.5 million tons and were less by 2.4 million tons than that of 1981.

Lead and Zinc.—Lead-zinc ore was extracted in seven underground mines. In 1981, 9,300 persons were employed in this sector of industry. Deposits of zinc and lead ore display a nest-like structure with varying degrees of fragmentation and with variations on the type of ore (oxide and sulfide). Proven reserves of these ores amounted to several hundred million tons, of which approximately 46% was found in active mining areas. Most of the reserve deposits were concentrated in newly discovered deposits in the Zawiercie region. Documented reserves could ensure extraction for about 40 years at the 1982 annual extraction rate of 5 million tons of lead-zinc ore. The main problem in lead-zinc mining was improving ways to exploit reserves located in safety pillars, adapting machinery and equipment to mine deposits less than 2 meters thick, and introducing technologies for better recovery of silver, cadmium, and thalium in the ore.

Other Minerals.—A team from Wroclow Technical University discovered concentrates of ilmenite, zircon, monazite, and garnets in the sand of the Odra and Slupsk riverbanks.

NONMETALS

Fertilizer Materials.—The Government made a decision to continue construction of the Police 2 chemical combine near Szezecin. Construction started at sulfuric and phosphoric acid plants. The sulfuric acid plant, with a projected capacity of 500,000 tons per year, was scheduled to be completed in April 1985, and the phosphoric acid plant, with a capacity of 143,000 tons per year, was scheduled to be completed in November 1985.

Poland produced less nitrogen fertilizers than it consumed. In 1982, exports of nitrogenous fertilizers in terms of nutrient content fell to 5,000 tons from 105,000 tons in 1981 and 365,000 tons in 1979. Imports increased from 55,000 tons in 1981 to 73,000 tons in 1982. Consumption tended to stagnate in recent years at about 1.3 million tons. The chemical plant at Police, founded in 1969, manufactured 800,000 tons of compound fertilizers, and the plan for 1983 called for producing 860,000 tons. Poland produced only 15% of the ammonia needed for fertilizer production, and the remainder was supplied by the Soviet Union. One ton of domestically produced ammonia cost Z18,000, but 1 ton of imported ammonia from the Soviet Union cost only Z11,500.

Kaolin.—The main kaolin deposits were located in the Boleslawski region in the vicinity of Nowogrodzice, where one opencast mine, Maria, with a capacity of 200,000 tons per year, was in operation. The country had only one kaolin processing plant, Surmin, with a capacity of about 45,000 tons per year, located near the mine. Output of enriched kaolin was 20% of the total mined. The types of kaolin produced at the plant were ceramic—used in the production of medium-quality china; paper—kaolin bleached chemically to an 80% degree whiteness; paper—for coating; ground—used in the rubber industry and in the production of glass fibers; and kaolin used in the production of refractory materials. Kaolin consumption of about 350,000 tons greatly surpassed production. About 30% of all kaolin came from the developed market economy countries. Poland's total reserves of kaolin are estimated at 180 million tons.

Salt.—Development of the Moszczemie Mine continued, with a projected capacity of 2 million tons of salt per year. The mine is located near Bochnia in the Tarnov Province, and production was scheduled to start in 1986.

Sulfur.—In 1982, production of sulfur increased compared with that of 1981 but did not reach the 1980 level of 5.1 million tons. Production was concentrated in the Tarnobrzeg region. Sulfur was surface mined at the Machov-Piaseczno Mine with an annual output of 0.3 to 0.4 million tons, and the ore was beneficiated at the nearby Tarnobrzeg complex. The Frasch process was used at the Grzybow and Jezierko Mines where sulfur was obtained from a depth of 120 to 180 meters in beds 10 to 15 meters thick and containing 17% to 21% sulfur. The largest sulfur mine was Jezierko with an annual capacity of 3.5 million tons. The Grzybow Mine was nearly exhausted; it produced about 0.8 million tons. Development of a new opencast mine was planned near Osiek. Deliveries to centrally planned economy countries in Europe and to the domestic market were mostly in liquid form and were transported by rail directly from the mines. Overseas supplies were shipped by rail in tank cars to Gdansk for export.

Sulfur exports in 1982 were 4% higher than the 3.82 million tons shipped in 1981. Sales to the Western World showed a 2% increase, rising to 1.97 million tons. Sales to centrally planned economy countries totaled 2.01 million tons in 1982, which was

an increase of 7% over that of 1981. Shipments to the U.S.S.R. increased from 793,000 tons in 1981 to 818,000 tons in 1982.

MINERAL FUELS

Total primary energy production was 223.2 million tons in standard coal equivalent (SCE). This represents a 21% increase in total primary energy production compared with the 1981 level. Lignite and bituminous coal accounted for 94% of the total primary energy. Total consumption of all types of primary energy reached 224.6 million tons SCE, with coal providing 80%; petroleum, 10.5%; natural gas, 8%; and others (peat, wood, and hydropower), 1.5%. The total apparent consumption of primary energy increased 12%.

Table 6.—Poland: Total primary energy balance

(Million tons of standard coal equivalent)[1]

	Total primary energy	Coal (lignite, bituminous, and coke)	Crude oil and petroleum products	Natural gas	Other
1981:					
Production	184.9	173.5	0.5	8.1	2.8
Imports	33.2	1.0	25.1	7.1	--
Exports	17.9	16.6	1.3	--	--
Apparent consumption	200.2	157.9	24.3	15.2	2.8
1982:					
Production	223.2	209.6	.5	9.8	3.3
Imports	32.7	1.0	24.2	7.5	--
Exports	31.3	30.3	1.0	--	--
Apparent consumption	224.6	180.3	23.7	17.3	3.3

[1]One ton of standard coal equivalent (SCE)=7,000,000 kilocalories. Conversion factors used are from the United Nations as follows: hard coal, 1.0; brown coal, 0.3; coke, 0.9; crude oil, 1.47; petroleum products, 1.54; and natural gas (1,000 cubic meters), 1.33.

Sources: Biuletyn Statystyczny (Statistical Bulletin), Warsaw, No. 5, 1983, pp. 16, 34, and 36. Rocznik Statystyczny (Statistical Yearbook), Warsaw, 1982, p. 177.

Coal.—Traditional miner work discipline was restored. The coal industry worked throughout the year without interruption at a normal level corresponding to the production capacities of the mines. Daily production reached a level of 630,000 tons. The increase in coal production was due primarily to mandatory Saturday work. Despite the intent of the economic reform to make the coal industry self-supporting, the Polish coal industry was steel-subsidized by the state budget. Regardless of the increase in producer and retail prices instituted in early 1982, the price of coal remained too low to cover the cost of production. Polish coal exports totaled 28.3 million tons in 1982, an increase of about 13.5 million tons compared with that of 1981. Exports to centrally planned economy countries totaled 14.1 million tons, and exports to developed market economy countries totaled 14.2 million tons. Polish coal exports to the Soviet Union were 8.7 million tons, representing 61% of Polish exports to the Eastern block. Poland intended to export 33 million tons of bituminous coal in 1983. In an effort to introduce new capacity, about Z21 billion[5] was invested in the coal industry in 1982.

There were 66 mines in operation. Five mines, the Czeczott, Budryk, Suszec, Kaczyce, and Warszowiey, were under construction. The mines under construction were designed to produce a total of almost 100,000 tons of coal per 24 hours. The first mine of the Lublin Field, the K-1 at Bogdanka, came into operation in December. When fully developed, the mine was expected to produce 12,000 tons per day. The initial rate of the Bogdanka Mine was 100 tons per day. The second mine, Stefanow, with a similar projected capacity was under development. About 700 meters of shaft were being driven at the mine.

The country's bituminous coal recoverable reserves were estimated at about 17.8 billion tons, and estimated reserves to a depth of 1,500 meters exceed 100 billion tons, according to the Polish Central Geological Office. About 66% of total proven reserves consist of power coal, 32% of coking coal, and 2% of other types. At the present annual production rate of 190 million tons, the deposits under exploitation would not be exhausted for about 70 years and the total proven reserves would last 130 years.

The plan for lignite production was fulfill-

ed. Lignite extraction was 2.5 million tons more than in 1981. Extraction at Belchatow reached about 2.2 million tons, and at another new opencast mine, Lubstowa near Konin, 0.5 million tons. Development of the Lubstow opencast mine was in progress for 3 years. The mine was planned to produce 6 million tons per year upon attaining full capacity. At Belchatow, the extraction of lignite was planned to reach 38.5 million tons, and the capacity of the electric powerplant was to reach 4,320 megawatts, which could nearly double the current capacity of the entire subsector. A new opencast mine, Szczercow, was planned to be developed near Belchatow in the next few years with a capacity of 20 million tons per year. The country's economic reserves of lignite were estimated at 6.5 billion tons.

Natural Gas.—The natural gas supply amounted to about 459 billion cubic feet, of which roughly 247 billion cubic feet came from indigenous fields and 212 billion cubic feet was imported from the U.S.S.R. However, demand for gas was planned to increase, especially for the production of nitrogenous fertilizers. There were no prospects for increased Soviet deliveries. Efforts were to be made to find and develop new resources, presumably in the Poznan area.

Over 184 million cubic feet of gas, valued at Z3.2 million, was produced at Krosno. Gas was also produced at Karlino and from new deposits at Trzesniow near Lublin. New deposits of natural gas were discovered offshore by the Petrobaltic rig.

Under a new agreement, Poland was to provide the U.S.S.R. during 1983-85 with 427 kilometers of gas pipes with diameters ranging from 530 to 1,420 millimeters and was also to install compressor stations and construct housing and amenities for gas workers. Payment was to be made later by the delivery of natural gas.

Petroleum.—Strict conservation policies were especially urgent with regard to hydrocarbon fuels. As a special concession, the U.S.S.R. had maintained oil deliveries at about the same level as in 1981 at about 119 million barrels of crude oil plus a smaller quantity of products. Poland's own crude oil production was insignificant. Gdansk refinery was operating at 70% of capacity. The entire production at the Gdansk refinery was based on crude oil received from Romashkino deposits in the U.S.S.R. The Plock refinery and petrochemical enterprise supplied 80% of the national requirement for refinery products. The Plock refinery was renovated, and the first catalytic cracking unit was repaired and modernized.

In 1982, the Karlino oil well in the Kosalin region produced about 537,135 barrels of oil. However, the gas pressure decreased and oil production was halted. There were thousands of tons of oil remaining in the deposit. To renew production, it was decided to build a 3.5-kilometer pipeline from Doszewo to the newly discovered gas deposits near Bialogard. The gas was to be injected into the strata to increase the pressure. Oil production started at Krepa near Zielona Gora. Production was expected to be about 370 to 520 barrels every 24 hours. The oil was to be supplied to the Jedlice refinery. New oilfields and gasfields were discovered at Trzesniow near Lublin.

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[1]Foreign mineral specialist, Division of Foreign Data.

[2]Depending upon the purpose of the exchange, the value of the zloty may vary considerably. Where necessary, values have been converted from the Polish zloty (Z) to U.S. dollars at the official exchange rate of Z34.46=US$1.00 (September 1981); U.S.S.R. rubles 1.00=US$1.50 approximately.

[3]Tribuna Ludu (Warsaw). Jan. 14, 1983, pp. 1-4.

[4]Maly Rocznik Statystyczny (Concise Statistical Yearbook of Poland) (Warsaw). 1983, p. 133.

[5]Work cited in footnote 3.

The Mineral Industry of Portugal

By Roman V. Sondermayer[1]

The severity of the international recession and limitations on foreign borrowing capacity were growth restraining factors in Portugal during 1982. Accordingly, the Government's medium-term development goals had to be modified. In general, strategy remained the same but priorities for the allocation of limited resources were reevaluated. Funding was cut for several major mineral-related projects such as Moncorvo iron, Seixal steel, and pyrite, and consequently their implementation was slowed down.

During the year, a major revision of Portugal's Constitution was completed and approved by the legislative bodies. The revision marked the end of the post-revolutionary transition period in Portugal and instituted full civilian control over the military. In addition, the revision altered the constitution's prescription of a collectivist economy to conform to the present mixed economic system. The significance of the Portuguese mineral industry to the world economy was modest, and only production of tungsten, about 3% of the world total, was important to the international market.

Major events related to minerals in Portugal were the continued development of the Neves-Corvo copper mine and modernization of the Panasqueira tungsten mine.

PRODUCTION

The mineral industry is owned by the Government and private entities. Large operations were owned by the Government.

Table 1.—Portugal: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Arsenic, white	253	[e]345	[e]200	[e]257	200
Beryl concentrate, gross weight	([2])	5	19	17	15
Columbite and tantalite concentrates, gross weight	8	4	4	12	12
Copper:					
Mine output, metal content	3,617	3,600	5,200	4,800	[p]3,600
Metal:					
Smelter, primary and secondary[e]	3,000	5,500	6,600	4,800	[p]4,500
Refined, primary	2,997	3,373	4,600	4,800	[p]4,600
Gold, mine output, metal content—troy ounces	9,131	[e]12,400	8,855	10,931	10,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight:					
Hematite and magnetite	19,761	22,119	14,773	--	--
Manganiferous	34,760	37,440	41,850	37,050	37,000
Total	54,521	59,559	56,623	37,050	37,000

See footnotes at end of table.

Table 1.—Portugal: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Iron and steel —Continued					
Iron ore and concentrate —Continued					
Iron content:					
Hematite and magnetite	13,437	15,040	10,046	--	--
Manganiferous	12,757	13,740	15,359	13,000	13,000
Total	26,194	28,780	25,405	13,000	13,000
Metal:					
Pig iron thousand tons	353	366	349	410	[p]215
Ferroalloys:					
Ferromanganese[e]	78,000	75,000	74,000	65,000	62,000
Silicomanganese[e]	15,000	15,000	17,000	18,000	16,000
Ferrosilicon[e]	30,000	25,000	25,000	24,000	21,000
Silicon metal[e]	20,000	32,000	33,000	32,000	30,000
Ferrotungsten	163	[e]200	[e]200	200	200
Total[e]	143,163	147,200	149,200	139,200	129,200
Crude steel thousand tons	577	649	653	551	[p]504
Semimanufactures do	643	640	650	NA	NA
Lead:					
Primary	118	--	--	--	--
Refined, secondary	286	31	1,000	1,200	[p]4,000
Silver, mine output, metal content troy ounces	[r]22,505	[r]35,365	28,935	38,580	40,000
Tin:					
Mine output, metal content	282	225	274	351	400
Metal, primary and secondary	854	1,121	938	[e]1,000	900
Titanium: Ilmenite concentrate, gross weight	325	268	234	334	300
Tungsten, mine output, metal content	1,104	1,377	1,568	1,395	1,360
Uranium concentrate: U content	102	134	95	120	130
Zinc: Smelter, primary	--	--	[e]2,000	4,600	4,200
NONMETALS					
Barite	620	704	1,200	1,350	1,300
Cement, hydraulic thousand tons	5,120	5,138	5,748	5,697	5,800
Clays:					
Kaolin	73,555	[e]54,000	49,274	52,846	53,000
Refractory	181,717	[e]100,000	202,899	259,852	250,000
Diatomite	2,700	3,400	2,710	2,690	2,600
Feldspar	21,582	33,808	48,561	44,007	43,000
Gypsum and anhydrite	208,701	[e]200,000	236,378	243,537	250,000
Lime, hydrated and quicklime thousand tons	260	261	270	260	250
Lithium minerals: Lepidolite	1,200	1,000	1,000	[e]900	800
Nitrogen: N content of ammonia thousand tons	252	222	200	133	[p]132
Pyrites and pyrrhotite (including cuprous), gross weight do	314	349	350	287	290
Salt:					
Rock do	326	408	401	408	400
Marine do	150	[e]140	130	120	100
Total do	476	548	531	528	500
Sand and gravel:					
Sand do	5,294	NA	5,046	5,430	NA
Gravel do	464	NA	NA	NA	NA
Sodium compounds, n.e.s.:					
Sodium carbonate	[r]131,724	182,770	175,000	170,000	170,000
Sodium sulfate	51,344	44,831	52,200	50,000	60,000
Stone:					
Basalt thousand tons	71	NA	56	124	NA
Calcareous:					
Dolomite do	93	NA	98	90	NA
Limestone, marl, calcite do	8,932	10,541	9,738	12,598	NA
Marble do	303	324	371	383	NA
Diorite do	620	NA	1,247	53	NA
Gabbro do	--	NA	205	73	NA
Granite do	6,796	4,796	5,502	5,933	NA
Graywacke do	38	NA	12	12	NA
Ophite do	65	NA	44	35	NA
Porphyry do	--	NA	NA	NA	NA
Quartz do	122	125	125	116	NA
Quartzite do	316	NA	480	587	NA
Schist do	275	NA	214	131	NA
Serpentine do	--	--	--	--	NA
Slate do	59	NA	NA	NA	NA
Syenite do	9	NA	NA	NA	NA

See footnotes at end of table.

Table 1.—Portugal: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Sulfur:					
Content of pyrites ____ thousand tons	136	151	155	[e]135	130
Byproduct, all sources ____ do	1	1	2	2	2
Total ____ do	137	152	157	[e]137	132
Talc ____	1,709	2,727	2,598	6,363	1,250
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite ____ thousand tons	180	179	177	184	170
Coke, metallurgical ____ do	203	179	140	NA	NA
Fuel briquets, all grades ____	290	247	200	NA	NA
Gas, manufactured ____ million cubic feet	4,965	4,900	5,000	NA	NA
Petroleum refinery products:					
Gasoline ____ thousand 42-gallon barrels	6,589	8,700	7,140	9,223	7,200
Jet fuel ____ do	2,827	3,696	3,000	4,813	3,300
Kerosine ____ do	640	947	900	NA	NA
Distillate fuel oil ____ do	9,647	22,402	18,500	1,268	2,700
Residual fuel oil ____ do	16,826	25,669	32,581	NA	NA
Lubricants ____ do	469	449	500	35,624	39,000
Other:					
Liquefied petroleum gas ____ do	1,495	2,045	2,000	NA	NA
Asphalt ____ do	348	547	2,000	NA	NA
Unspecified ____ do	1,664	3,600	4,000	NA	NA
Refinery fuel and losses ____ do	4,004	[e]5,100	5,000	NA	NA
Total ____ do	44,509	73,155	75,621	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 12, 1983.
[2]Less than 1/2 unit.

TRADE

As in the past, during 1981, the latest year for which complete data were available, Portugal's mineral trade balance was negative. Total country imports were close to $9.8 billion, of which approximately 33% or $3.3 billion were minerals. Among minerals, the largest item was imports of fuel, mostly petroleum, which accounted for about 73% of the value of imported minerals. During the same year, the value of Portugal's exports was $4.1 billion, of which minerals accounted for about $0.6 billion or 15%. As in imports, fuels, mostly petroleum refinery products, were the most valued item accounting for about 49% of total mineral exports.

Table 2.—Portugal: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	--	1	--	All to Cape Verde.
Metal including alloys:				
Scrap	3,406	4,426	--	Spain 3,781; West Germany 450; Netherlands 124.
Unwrought	286	370	--	France 259; Spain 106.
Semimanufactures	3,819	2,576	--	Spain 933; France 628; India 243.
Beryllium: Metal including alloys, all forms	40	--		
Chromium: Oxides and hydroxides	2	2	--	Mainly to Angola.
Copper:				
Ore and concentrate	550	1,100	--	All to Belgium-Luxembourg.
Matte and speiss including cement copper	502	--		
Metal including alloys:				
Scrap	60	17	--	West Germany 12; United Kingdom 5.
Unwrought	1,623	2,884	--	Finland 1,000; West Germany 676; Yugoslavia 501.
Semimanufactures	1,376	1,291	512	Belgium-Luxembourg 300; Netherlands 160; Sweden 143.

Table 2.—Portugal: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	--	92	--	West Germany 50.
Pyrite, roasted	20,531	14,315	--	All to West Germany.
Metal:				
Scrap	4,515	4,681	--	Netherlands 2,269; Spain 1,990; Belgium-Luxembourg 239.
Pig iron, cast iron, related materials	10	41	--	Angola 40.
Ferroalloys:				
Ferromanganese	56,456	26,617	20,450	Italy 2,785; Greece 2,545; Algeria 425.
Unspecified	28,778	19,382	5,085	West Germany 8,063; Greece 3,390; United Kingdom 1,391.
Semimanufactures:				
Bars, rods, angles, shapes, sections	43,791	3,304	(1)	Angola 1,033; Cape Verde 1,028; Spain 526.
Universals, plates, sheets	22,717	13,707	--	Romania 7,262; Hungary 2,343; Switzerland 1,671.
Hoop and strip	379	3,022	--	Angola 2,142; France 783; Nigeria 85.
Rails and accessories	400	472	--	Cuba 469.
Wire	3,500	567	--	Spain 211; West Germany 157; Mozambique 90.
Tubes, pipes, fittings	5,106	3,590	--	France 802; Italy 570; Switzerland 392.
Castings and forgings, rough	8,171	6,427	1,419	United Kingdom 3,292; Sweden 701; France 317.
Lead:				
Ore and concentrate	1,420	956	--	All to Belgium-Luxembourg.
Oxides	104	17	--	All to Mozambique.
Metal including alloys:				
Scrap	5	19	--	Angola 12; United Kingdom 6.
Unwrought	15	49	--	Angola 32; Mozambique 14.
Magnesium: Metal including alloys, semimanufactures	--	5	--	Angola 3; Cape Verde 2.
Manganese:				
Ore and concentrate, metallurgical-grade	650	3,410	--	Japan 3,000; Italy 300.
Metalloids: Unspecified	19,573	13,029	2,000	West Germany 2,988; Netherlands 2,500; Japan 2,340.
Nickel: Metal including alloys:				
Scrap	7	183	--	Netherlands 160; United Kingdom 22.
Semimanufactures	15	--		
Platinum group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$1,365	$1,966	--	France $1,533; United Kingdom $240; West Germany $148.
Silver:				
Waste and sweepings[2] do	$522	$126	--	West Germany $62; United Kingdom $48; France $16.
Metal including alloys, unwrought and partly wrought do	$5,341	$132	--	United Kingdom $124; Cape Verde $4; Mozambique $3.
Tin: Metal including alloys:				
Unwrought	2	3	--	All to Angola.
Semimanufactures	9	1	--	NA.
Tungsten:				
Ore and concentrate	2,091	2,401	756	United Kingdom 478; Belgium-Luxembourg 342; Netherlands 160.
Metal including alloys, all forms	12	172	--	Netherlands 92; Japan 80.
Zinc:				
Oxides	2,108	1,984	--	Italy 904; United Kingdom 790; Republic of South Africa 78.
Metal including alloys:				
Unwrought	22	8	--	Angola 5.
Semimanufactures	1	90	--	Bahrain 50; Guinea-Bissau 9.
Other:				
Ores and concentrates	6	53	23	West Germany 28.
Oxides and hydroxides	3	--		
Ashes and residues	6,667	1,825	--	Netherlands 1,500; West Germany 150; Belgium-Luxembourg 102.
Base metals including alloys, all forms	1	3	--	Mainly to Angola.

See footnotes at end of table.

Table 2.—Portugal: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	74,118	16,467	--	United Kingdom 8,545; West Germany 6,872; Norway 1,007.
Grinding and polishing wheels and stones	62	243	15	Iran 90; West Germany 37; Angola 27.
Asbestos, crude	(1)	--		
Cement	9,193	26,285	--	Cape Verde 20,043; Gibraltar 3,922; Guinea-Bissau 1,971.
Chalk	11	62	--	Cape Verde 34; Sao Tome and Principe 22.
Clays and clay products:				
Crude, unspecified	119	1,068	--	Spain 1,025; Angola 32.
Products:				
Nonrefractory	38,849	44,165	374	France 14,707; Spain 7,703; West Germany 5,539.
Refractory including nonclay brick	1,136	834	--	Guinea-Bissau 437; Guinea 158; Angola 77.
Diamond: Gem, not set or strung value, thousands	$107,464	$101,046	--	All to Switzerland.
Diatomite and other infusorial earth	44	44	--	Venezuela 30; Guinea-Bissau 8.
Feldspar, fluorspar, related materials, unspecified	11,278	11,301	--	German Democratic Republic 3,880; West Germany 3,800; France 2,654.
Fertilizer materials:				
Crude, n.e.s	--	70	--	All to Spain.
Manufactured:				
Ammonia	7,308	275	--	NA.
Nitrogenous	111,723	92,595	--	West Germany 43,895; Netherlands 21,950; Brazil 16,275.
Phosphatic	61,595	66,326	--	Nigeria 25,226; Brazil 22,000; United Kingdom 6,800.
Potassic	1,394	(1)	--	All to Angola.
Unspecified and mixed	70,214	47,770	--	China 13,000; United Kingdom 10,985; Belgium-Luxembourg 10,920.
Graphite, natural	97	176	--	Spain 166; Angola 7.
Gypsum and plaster	103	99	--	Mozambique 75; Cape Verde 20.
Halogens: Unspecified	(1)	(1)	--	All to Cape Verde.
Lime	456	237	--	Mozambique 213; Cape Verde 24.
Mica:				
Crude including splittings and waste	--	189	--	United Kingdom 149; Italy 40.
Worked including agglomerated splittings	1,000	--		
Nitrates, crude	9	--		
Pigments, mineral: Iron oxides and hydroxides, processed	25	37	--	Cape Verde 21; Algeria 15.
Salt and brine	1,524	371	84	France 144; West Germany 40; United Kingdom 40.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	--	18	--	Guinea-Bissau 17.
Sodium carbonate, natural and manufactured	11,575	1,055	--	Spain 986; Cyprus 60.
Sodium hydroxide	32	90	--	Angola 43; Guinea-Bissau 32; Sao Tome and Principe 12.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	145,854	116,625	204	Italy 33,577; Spain 32,919; Japan 21,831.
Worked	222,113	193,152	3,043	West Germany 126,699; United Kingdom 13,821; Saudi Arabia 10,850.
Gravel and crushed rock	1,603	1,880	--	Spain 1,808; France 39.
Limestone other than dimension	131	639	--	Mozambique 285; Cape Verde 163; Guinea-Bissau 104.
Quartz and quartzite	1,472	1,634	--	West Germany 749; United Kingdom 369; Ireland 280.
Sand other than metal-bearing	12,455	13,953	--	Gilbraltar 13,130; Panama 760.
Sulfur:				
Elemental, crude including native and byproduct	83	120	--	All to Spain.
Sulfuric acid	23,895	16,619	--	Turkey 13,256; Algeria 3,127.
Talc, steatite, soapstone, pyrophyllite	33	--		

See footnotes at end of table.

Table 2.—Portugal: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Other:				
Crude	159	112	--	Spain 44; Sao Tome and Principe 31; Guinea-Bissau 16.
Slag and dross, not metal-bearing	--	3,300	--	All to France.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1,867	2,989	--	France 1,789; Spain 598; Cape Verde 425.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	22	--		
Carbon: Carbon black	11	--		
Coal: Anthracite and bituminous	9	--		
Coke and semicoke	20	26	--	Zaire 15; Angola 10.
Peat including briquets and litter	10	--		
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	13	14	--	Cape Verde 12; Gibraltar 1.
Gasoline do	r2,030	3,173	--	France 1,112; United Kingdom 818; Netherlands 689.
Mineral jelly and wax do	r13	10	--	West Germany 9.
Kerosine and jet fuel do	r1,629	2,351	--	Iran 512; Netherlands 162; bunkers 1,436.
Distillate fuel oil do	1,583	618	--	Denmark 157; Iceland 156; bunkers 237.
Lubricants do	96	175	(1)	Spain 60; Netherlands 37; Greece 34.
Residual fuel oil do	2,598	548	--	Spain 240; bunkers 308.
Bitumen and other residues do	205	(1)	--	All to Cape Verde.
Bituminous mixtures do	2	(1)	--	Mainly to Cape Verde.
Tars and other crude chemicals derived from coal, gas, and petroleum	621	13	--	Cape Verde 6; Mozambique 3; Angola 2.

rRevised. NA Not available.
1Less than 1/2 unit.
2May include other precious metals.

Table 3.—Portugal: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified value, thousands	$7	$5	--	West Germany $4.
Aluminum:				
Ore and concentrate	2,578	48	--	All from Spain.
Oxides and hydroxides	4,576	8,365	28	United Kingdom 4,750; France 1,971; West Germany 1,436.
Metal including alloys:				
Scrap	103	403	3	Spain 360; West Germany 28.
Unwrought	27,403	42,348	222	Spain 25,042; France 4,834; Norway 4,249.
Semimanufactures	15,532	14,087	34	Spain 3,257; Belgium-Luxembourg 2,481; Austria 1,803.
Chromium:				
Ore and concentrate	410	352	--	Republic of South Africa 312; Netherlands 40.
Oxides and hydroxides	198	241	--	West Germany 225; Spain 11.
Cobalt: Oxides and hydroxides	4	6	--	Belgium-Luxembourg 3; United Kingdom 3.

Table 3.—Portugal: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Columbium and tantalum: Metals including alloys, all forms, tantalum	(1)	1	--	Mainly from France.
Copper:				
Ore and concentrate	10	140	--	Australia 50; Republic of South Africa 50; Netherlands 40.
Matte and speiss including cement copper	1,797	2,565	--	Chile 1,469; Peru 626; Netherlands 209.
Metal including alloys:				
Scrap	244	220	5	Spain 106; Belgium-Luxembourg 39; Italy 30.
Unwrought	12,463	12,757	--	Belgium-Luxembourg 4,287; France 1,511; Canada 1,503.
Semimanufactures	14,711	16,945	(1)	France 3,650; Sweden 2,866; United Kingdom 2,764.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	494,918	524,112	--	Republic of South Africa 127,611; Venezuela 119,206; Mauritania 100,799.
Pyrite, roasted	2	--		
Metal:				
Scrap	149,205	84,537	285	United Kingdom 48,803; Netherlands 21,633; U.S.S.R. 10,018.
Pig iron, cast iron, related materials	41,635	74,681	--	Spain 62,210; West Germany 9,526; Canada 1,524.
Ferroalloys:				
Ferromanganese	132	111	--	West Germany 75; France 32.
Unspecified	1,242	1,259	3	United Kingdom 353; Spain 208; France 191.
Steel, primary forms	254,203	230,680	--	West Germany 80,908; Netherlands 33,173; France 26,517.
Semimanufactures:				
Bars, rods, angles, shapes, sections	125,399	132,801	67	Spain 38,170; West Germany 37,412; France 15,089.
Universals, plates, sheets	272,603	266,484	7,038	West Germany 95,583; Belgium-Luxembourg 38,339; France 37,734.
Hoop and strip	54,072	54,328	111	West Germany 33,728; France 10,447; Belgium-Luxembourg 4,419.
Rails and accessories	1,682	10,082	--	France 5,012; West Germany 4,564; Belgium-Luxembourg 372.
Wire	22,071	26,923	73	Spain 11,476; West Germany 4,344; Belgium-Luxembourg 3,601.
Tubes, pipes, fittings	25,855	24,632	472	West Germany 11,567; Japan 2,650; France 1,846.
Castings and forgings, rough	708	1,168	13	West Germany 385; United Kingdom 262; France 164.
Lead:				
Ore and concentrate	100	1,500	--	Suriname 1,380; Spain 120.
Oxides	81	24	18	United Kingdom 6.
Metal including alloys:				
Scrap	1,050	21	--	United Kingdom 20.
Unwrought	16,469	17,808	2,645	United Kingdom 11,339; Australia 1,995; Canada 759.
Semimanufactures	18	7	--	West Germany 5; Spain 1.
Magnesium: Metal including alloys:				
Unwrought	3	--		
Semimanufactures	8	13	--	United Kingdom 6; Norway 3; Denmark 1.
Manganese:				
Ore and concentrate, metallurgical-grade	173,823	109,916	--	Brazil 65,605; Republic of South Africa 30,238; Gabon 14,044.
Oxides	1,206	847	(1)	United Kingdom 319; Netherlands 134; Ireland 120.
Mercury 76-pound flasks	928	841	--	Spain 638; China 58; Mexico 58.
Metalloids: Unspecified	10	22	--	West Germany 8; Sweden 8; United Kingdom 6.
Molybdenum: Metal including alloys, all forms	2	2	(1)	Belgium-Luxembourg 1; Sweden 1.

See footnotes at end of table.

Table 3.—Portugal: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss	34	39	--	United Kingdom 15; Norway 11; Netherlands 10.
Metal including alloys:				
Scrap	35	12	--	NA.
Unwrought	888	455	--	West Germany 223; Canada 116; United Kingdom 34.
Semimanufactures	433	350	1	Finland 151; West Germany 102; France 32.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$3,168	$3,280	$1	West Germany $1,485; France $1,213; United Kingdom $421.
Silver: Metal including alloys, unwrought and partly wrought do	$3,048	$7,055	--	West Germany $6,393; United Kingdom $272; Switzerland $168.
Tin:				
Ore and concentrate	308	63	--	All from Thailand.
Metal including alloys:				
Scrap	25	20	--	Mainly from Malaysia.
Unwrought	571	422	--	Malaysia 190; Thailand 60; United Kingdom 46.
Semimanufactures	37	56	(1)	United Kingdom 23; Netherlands 20; West Germany 8.
Titanium: Oxides	8,749	8,937	177	Spain 2,092; West Germany 1,795; Finland 1,307.
Tungsten: Metal including alloys, all forms	1	2	(1)	Denmark 1; West Germany 1.
Uranium and/or thorium: Metal including alloys, all forms value, thousands	--	$2	--	All from Netherlands.
Zinc:				
Ore and concentrate	--	22	--	All from Spain.
Oxides	173	173	22	West Germany 49; Spain 49; France 24.
Metal including alloys:				
Scrap	1,138	51	--	Netherlands 50.
Unwrought	16,722	11,661	--	Canada 3,312; Netherlands 2,691; Belgium-Luxembourg 1,981.
Semimanufactures	1,528	1,733	--	West Germany 566; Belgium-Luxembourg 365.
Other:				
Ores and concentrates	2,816	2,220	--	Spain 1,646; Australia 191; Netherlands 164.
Oxides and hydroxides	1,981	1,239	--	United Kingdom 632; West Germany 208; Spain 181.
Ashes and residues	490	--		
Base metals including alloys, all forms	83	253	8	Belgium-Luxembourg 168; China 20; Italy 12.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	523	900	28	Italy 258; Denmark 220; Greece 183.
Artificial: Corundum	1,439	1,561	3	West Germany 784; Brazil 445; France 170.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$676	$867	$17	West Germany $413; Ireland $225; United Kingdom $129.
Grinding and polishing wheels and stones	618	643	6	Italy 234; Spain 112; United Kingdom 64.
Asbestos, crude	19,708	18,870	10	Canada 7,766; Republic of South Africa 6,706; Zimbabwe 2,280.
Barite and witherite	1,980	2,233	--	Spain 1,072; Morocco 750; West Germany 252.
Boron materials:				
Crude natural borates	5,965	10,616	2,400	Turkey 7,674; Netherlands 504; Greece 22.
Oxides and acids	612	903	--	France 888; Spain 15.
Cement	220,939	315,532	--	Spain 311,966; Belgium-Luxembourg 442.
Chalk	11,190	11,193	--	Spain 4,587; France 3,973; United Kingdom 1,446.

See footnotes at end of table.

Table 3.—Portugal: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude, unspecified	41,485	43,790	470	Spain 25,850; United Kingdom 12,296; France 2,795.
Products:				
Nonrefractory	565	531	--	Spain 301; Italy 136; Sweden 49.
Refractory including nonclay brick	13,670	12,198	679	West Germany 4,350; Austria 2,503; France 1,956.
Cryolite and chiolite	100	80	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$109,890	$79,184	$1	Switzerland $66,441; Netherlands $499; unspecified $11,683.
Industrial do	--	$53	--	Belgium-Luxembourg $39; United Kingdom $14.
Diatomite and other infusorial earth	4,284	3,823	550	Spain 2,544; France 501; West Germany 184.
Feldspar, fluorspar, related materials:				
Unspecified	2,022	2,423	--	France 1,993; United Kingdom 365; Spain 49.
Fertilizer materials: Manufactured:				
Ammonia	27,525	60,077	--	U.S.S.R. 37,215; United Kingdom 6,374; France 6,034.
Nitrogenous	29,767	24,199	--	United Kingdom 10,248; Ireland 4,987; Romania 3,600.
Phosphatic	1,678	900	--	All from France.
Potassic	86,125	90,857	--	Spain 75,250; West Germany 5,607; U.S.S.R. 5,000.
Unspecified and mixed	4,514	8,593	7,978	Belgium-Luxembourg 296; West Germany 152; United Kingdom 90.
Graphite, natural	388	174	(1)	United Kingdom 47; Norway 41; Italy 37.
Gypsum and plaster	35,118	46,958	18	Spain 43,890; Morocco 2,616; West Germany 218.
Halogens:				
Chlorine	395	1,256	--	All from Spain.
Unspecified	56	11	--	Japan 9; France 1; West Germany 1.
Lime	768	810	--	Spain 792; France 18.
Magnesium compounds: Magnesite	5,317	4,868	9	United Kingdom 3,173; Austria 764; West Germany 374.
Mica:				
Crude including splittings and waste	336	464	(1)	Norway 325; United Kingdom 76; France 50.
Worked including agglomerated splittings	19	21	1	France 9; Switzerland 4; Spain 2.
Nitrates, crude	514	1,087	--	Chile 997; West Germany 54; Poland 36.
Phosphates, crude	452,105	342,560	4,925	Morocco 333,431; Ivory Coast 4,178.
Pigments, mineral: Iron oxides and hydroxides, processed	1,982	2,008	--	West Germany 1,441; Spain 500; United Kingdom 34.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$135	$123	--	Belgium-Luxembourg $51; United Kingdom $35; France $20.
Synthetic do	$30	$9	--	West Germany $3; Switzerland $3; Austria $2.
Pyrite, unroasted	--	2,205	--	All from Spain.
Salt and brine	91,072	51,564	--	Italy 35,817; Spain 15,591.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	396	613	--	Italy 368; France 177; Spain 48.
Sodium carbonate, natural and manufactured	1	(1)	--	All from West Germany.
Sodium hydroxide	20,877	24,433	(1)	Spain 15,538; Belgium-Luxembourg 8,183; France 679.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	73	260	--	France 144; Brazil 82; Italy 25.
Worked	99	153	(1)	Spain 85; Italy 43; France 15.
Dolomite, chiefly refractory-grade	5,936	7,588	--	Italy 2,589; France 2,135; Norway 1,487.
Gravel and crushed rock	44	445	--	Spain 211; Italy 119; France 75.
Limestone other than dimension	1,500	1,500	--	All from France.
Quartz and quartzite	205	663	--	Spain 493; Belgium-Luxembourg 123; Switzerland 20.

See footnotes at end of table.

Table 3.—Portugal: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Sand other than metal-bearing	8,782	6,330	31	Spain 5,339; Belgium-Luxembourg 637; Sweden 200.
Sulfur:				
Elemental:				
Crude including native and by-product	92,978	117,876	--	France 111,492; Sweden 6,384.
Colloidal, precipitated, sublimed	1	1	--	Mainly from France.
Sulfuric acid	3,157	10,090	1	France 6,569; Belgium-Luxembourg 3,499.
Talc, steatite, soapstone, pyrophyllite	3,638	4,076	235	France 2,159; Austria 568; Norway 488.
Other:				
Crude	660	574	--	Spain 276; China 200; Italy 36.
Slag and dross, not metal-bearing	58,465	55,002	--	France 54,314; United Kingdom 687.
Oxides and hydroxides of barium, magnesium, strontium	42	44	4	France 20; Italy 11; Spain 7.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	562	608	--	France 437; United Kingdom 83; Belgium-Luxembourg 75.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,177	1,767	87	Spain 1,073; West Germany 605.
Carbon: Carbon black	10,722	11,234	47	Spain 7,136; France 2,630; West Germany 836.
Coal:				
Anthracite and bituminous	309,515	347,952	299,063	United Kingdom 30,020; Poland 8,033; Spain 4,348.
Briquets of anthracite and bituminous coal	12	--		
Lignite including briquets	3,956	998	--	All from German Democratic Republic.
Coke and semicoke	117,208	68,457	--	United Kingdom 26,330; Netherlands 15,572; France 8,979.
Peat including briquets and litter	1,183	1,142	--	West Germany 575; Sweden 310; Denmark 73.
Petroleum and refinery products:				
Crude -- thousand 42-gallon barrels	58,767	55,224	--	Saudi Arabia 13,539; Iraq 10,312; United Arab Emirates 7,808.
Refinery products:				
Liquefied petroleum gas -- do	3,132	3,106	--	United Kingdom 1,640; France 588; Netherlands 276.
Gasoline -- do	251	898	(1)	Belgium-Luxembourg 206; Spain 187; Bahrain 186.
Mineral jelly and wax -- do	14	17	(1)	West Germany 6; Spain 5; France 3.
Kerosine and jet fuel -- do	149	75	(1)	Netherlands 19; France 18; unspecified 35.
Distillate fuel oil -- do	1,171	809	41	U.S.S.R. 348; France 218; Netherlands 72.
Lubricants -- do	308	279	6	Netherlands 92; Belgium-Luxembourg 49; France 46.
Residual fuel oil -- do	2,676	1,412	--	France 781; Netherlands 294; Belgium-Luxembourg 169.
Bitumen and other residues -- do	246	263	28	Spain 195; Netherlands 11.
Bituminous mixtures -- do	50	30	(1)	Spain 13; West Germany 6; France 3.
Petroleum coke -- do	46	28	24	Spain 4.
Tars and other crude chemicals derived from coal, gas, and petroleum	13,181	14,733	3	Spain 4,239; Netherlands 4,023; United Kingdom 1,890.

NA Not available.
[1]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Copper.—Development of the complex sulfide lead-zinc-copper deposit at Neves-Corvo in southern Portugal continued. With about 50,000 meters of diamond drilling completed, results have confirmed earlier reports that reserves at Neves-Corvo were over 60 million tons of ore. Of the total, the Neves ore body contained about 21 million tons of zinc ore with an average metal content of 5% zinc, 0.15% copper, and 0.9% lead; 5 million tons of complex ores containing 4.9% copper, 2.8% zinc, and 0.4% lead; and 1 million tons of disseminated cupriferous ore with 1.9% copper, 0.6% zinc, and 0.18% lead. In the Corvo ore body, reserves were reported at 34 million tons with about 13 million tons containing 7% copper, 16 million tons showing 4.8% copper, and about 5 million tons of zinc-lead ore with 5% zinc, 1% lead, and 0.15% copper. In addition, pyrite found in the deposits of Neves-Corvo contains 0.38% copper, 0.4% zinc, and about 10 grams of silver per ton of ore.

Neves-Corvo will consist of an underground mine and a flotation plant. Opening of the new mine will be by a 5-meter-diameter vertical shaft and a 5,000-meter-long ramp, the cross section of which is 22 square meters. Production was scheduled to start in 1986 at a planned 1 million tons per year of ore yielding 200,000 tons of concentrates with 25% copper. The operator was Sociedade Mineira de Neves-Corvo S.A.R.L. (Somincor) in which the Government of Portugal had 51% interest, and the Bureau de Recherches Géologiques et Minières (BRGM) of France and the Sociedade Mineira de Penarroya, 24.5% each. Total investment was planned at $200 million at 1982 prices. Somincor also planned to ask for bids for deliveries of mining and metallurgical equipment during 1983.

Iron Ore.—At the Moncorvo iron ore deposit, development has been slowed because of budgetary restraints. Basic engineering work was completed, including the list of equipment. However, the Government has not announced its decision on building the necessary rail connection between Moncorvo and the rest of the country.

Tungsten.—Modernization of the Panasqueira Mine continued. Tests were completed on a new underground primary crushing plant and a 300-meter-long conveyor belt that brings the ore to the surface.

NONMETALS

The United S.A.R.L. has acquired a majority interest in the Clona salt mines in Algarve. A study was underway to determine if the Clona Mine could be expanded so that its output could meet the country's salt demand.

MINERAL FUELS

Coal.—The Government has announced a decision to form a company that would have exclusive rights to explore for coal and promote production. However, at yearend, name and details on the structure of the new entity were not available.

Uranium.—The Empresa Nacional del Uranio S.A. completed its uranium exploration program in the Nisa area in Alto Alentejo, but at the end of 1982 results were not available.

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[1]Physical scientist, Division of Foreign Data.

The Mineral Industry of Romania

By Walter Steblez[1]

In 1982, Romania's centrally planned economy further displayed the declining trends that marked its performance in both 1980 and 1981. Planned targets for most of the major economic indicators were not met. The net material product (gross national product minus services) grew by only 2.6%; investment declined by 2.5%, and industrial production grew by 3%.

Romania's industrial labor force showed no net change from 1981; however, industrial labor productivity reportedly grew by only 1%. The relative share of the mining, fuel, and metallurgical industries remained at over 14% of the gross output of industry.

Although Romania produced a wide variety of both metallic and nonmetallic industrial minerals, it remained a net importer of metalliferous ores, fuels, and a number of nonmetallic minerals.

Several new facilities in the steel industry were put into operation during the year; these included a new 25,000-ton-per-year steel foundry at Medgidia and a 1,000,000-ton-per-year coking battery at the Galati steel complex. In nonferrous mining, reportedly, a new 1,000-ton-per-day copper concentrator was put into operation late in the year at the Rosia Poieni mining complex in the Rosia Montana area. In the transportation field, Romania reported launching its fifth 65,000-deadweight-ton ore carrier. The total capacity of the country's merchant fleet was about 2,700,000 deadweight tons.

Government Policies and Programs.—Government policies were directed at issues that over a number of years served as serious bottlenecks within the mining and processing industries. These included late delivery or nondelivery of allocated capital equipment and the delivery of wrong or faulty components. In the first 5 months of 1982, in the metallurgical sector alone, this problem caused extended startup delays for new capacities that were to produce 5 million tons of iron pellets, about 1.5 million tons of cast iron, and 650,000 tons of rolled steel.[2] During the year, reportedly, 14.4% of the total machinery and equipment deliveries for mining and 43.6% for metallurgy lagged considerably behind schedule. Paradoxically, the situation caused large uninstalled equipment stockpiles to develop at these enterprises because equipment necessary for the installation of these stocks was unavailable. Another difficulty was the inefficient use of labor and machinery. Downtime of scrapers, bulldozers, excavators, etc., was well above 50%. In many cases, labor skills and qualifications were too low to be able to use new machinery and equipment at the minesite efficiently. The ratio of working miners to auxiliary mine personnel was low, ranging from 1:5 to 1:6. Mining engineers were reportedly, in many cases, spending too much time performing administrative office duties and not enough time in the mines.

Planned training programs in mining and equipment operation and the creation of centralized mining machine building and spare parts supply enterprises were to be set up to alleviate these and other problems. The ratio of auxiliary to production workers in mining was planned to be reduced to 2.5:1 to 3:1.

Romania's 1983 national economic plan called for modest increases in the production of steel, crude oil, coal, and electric power. Special emphasis was to be placed on the production of stainless and specialty steel products as well as more efficient secondary recovery of nonferrous metals.

PRODUCTION

Romania's totally nationalized mineral industry produced less bauxite, aluminum, copper, pig iron, and crude steel than in 1981. The production of coal and fossil fuels generally remained the same or slightly exceeded 1981 production levels. Production shortfalls were attributed to structural inefficiency of the mineral industry as well as an increasingly more difficult geological environment for mining. The country's mineral reserve base continued to decline. Attempts were to be made during the 1981-85 5-year plan to mechanize and improve efficiency in mining.

Table 1.—Romania: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite, gross weight	707,767	708,000	[e]710,000	712,000	680,000
Alumina, calcined, gross weight	449,000	502,000	534,000	540,000	520,000
Ingot including alloys:					
Primary	213,000	217,000	241,000	251,000	208,000
Secondary	18,000	19,000	18,000	18,000	18,000
Total	231,000	236,000	259,000	269,000	226,000
Bismuth, mine output, metal content[e]	80	80	80	80	80
Cadmium metal, smelter[e]	90	90	85	85	80
Copper:					
Mine output, metal content[e]	27,000	29,000	28,000	27,000	26,000
Smelter:					
Primary	38,880	41,120	40,675	[e]40,500	35,000
Secondary[e]	4,000	4,000	4,000	4,000	4,000
Total	42,880	45,120	44,675	[e]44,500	39,000
Refined, primary and secondary[e]	40,488	42,000	42,000	42,000	40,000
Gold, mine output, metal content[e] troy ounces	65,000	65,000	65,000	65,000	65,000
Iron and steel:					
Iron ore thousand tons	2,511	2,523	2,333	[e]2,400	2,400
Metal:					
Pig iron do	8,155	8,879	9,012	8,857	[3]8,850
Crude steel do	11,779	12,909	13,175	13,025	13,000
Semimanufactures:					
Castings and forgings, finished do	1,097	1,176	1,220	[e]1,200	1,200
Pipes and tubes do	1,419	1,500	1,464	[e]1,500	1,500
Rolled products do	8,958	9,482	9,319	[3]9,600	9,600
Lead:					
Mine output, metal content	33,300	33,300	33,500	[e]33,500	33,500
Metal, smelter, primary and secondary	42,815	40,900	40,991	41,000	41,000
Manganese:[e]					
Ore:					
Gross weight	80,000	80,000	80,000	80,000	80,000
Metal content	17,000	17,000	17,000	17,000	17,000
Concentrate, gross weight	28,000	28,000	28,000	28,000	28,000
Silver, mine output, metal content thousand troy ounces	1,030	965	900	[e]850	850
Zinc:					
Mine output, metal content	60,000	60,000	60,000	[e]55,000	55,000
Metal, smelter, primary and secondary	49,790	46,486	45,906	[e]40,000	40,000
NONMETALS					
Barite	[r]82,000	[r]81,900	80,000	[r e]79,000	78,000
Cement, hydraulic thousand tons	14,688	15,598	15,611	14,750	15,000
Clays:[e]					
Bentonite	[r]162,000	[r]179,000	176,500	176,000	175,000
Kaolin	90,000	90,000	90,000	90,000	90,000
Diatomite[e]	40,000	40,000	40,000	40,000	40,000
Feldspar[e]	60,000	60,000	60,000	60,000	60,000
Fluorspar[e]	20,000	20,000	20,000	20,000	20,000
Graphite	[r]11,300	[r]12,400	12,500	[r e]12,500	12,500
Lime thousand tons	3,657	3,829	3,813	[e]3,800	3,500
Nitrogen: N content of ammonia do	2,257	2,335	2,248	2,381	2,400
Pyrites, gross weight[e] do	930	930	930	930	930

See footnotes at end of table.

Table 1.—Romania: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Salt:					
Rock salt ____ thousand tons	1,657	1,650	1,770	[e]1,700	1,700
Other ____ do	3,082	3,070	3,286	[e]3,300	3,300
Total ____ do	4,739	4,720	5,056	[e]5,000	5,000
Sand ____ do	1,367	[r]2,388	2,716	[r e]2,800	2,900
Sodium compounds, n.e.s.:					
Caustic soda ____ do	725	704	723	725	720
Sodium carbonate, manufactured, 100% Na_2CO_3 basis ____ do	899	893	937	[e]970	960
Sulfur:[e]					
S content of pyrites ____ do	400	400	400	400	400
Byproduct, all sources ____ do	120	130	140	150	150
Total ____ do	520	530	540	550	550
Sulfuric acid ____ do	1,655	1,750	1,850	1,950	20,000
Talc[e] ____	66,000	60,000	60,000	60,000	60,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black ____	108,964	95,122	101,849	[e]102,000	103,000
Coal:					
Run-of-mine:					
Anthracite and bituminous thousand tons	8,794	9,299	9,686	[e]9,700	9,700
Brown ____ do	641	633	680	[e]700	700
Lignite ____ do	22,019	24,956	27,448	[e]27,000	27,500
Total ____ do	31,454	34,888	37,814	[e]37,400	37,900
Washed (produced from above):					
Anthracite and bituminous:					
For coke and semicoke production do	2,450	2,205	2,337	[e]2,300	2,300
For other uses ____ do	4,968	5,903	5,723	[e]5,700	5,700
Brown ____ do	606	601	648	[e]600	600
Lignite ____ do	21,239	24,055	26,456	[e]26,000	27,000
Total ____ do	29,263	32,764	35,164	[e]34,600	35,600
Coke:					
Metallurgical ____ do	3,458	3,066	3,033	[e]3,000	3,000
Other ____ do	384	385	470	[e]450	450
Total ____ do	3,842	3,451	3,503	3,450	3,450
Fuel briquets (from brown coal) ____ do	711	720	730	730	730
Gas: Natural:					
Gross:					
Associated ____ million cubic feet	232,016	242,540	247,732	[e]250,000	150,000
Nonassociated ____ do	1,023,167	960,166	994,427	[e]995,000	1,100,000
Total ____ do	1,255,183	1,202,706	1,242,159	[e]1,245,000	1,250,000
Marketed ____ do	1,211,697	1,161,100	1,198,683	[e]1,200,000	1,100,000
Petroleum:					
Crude:					
As reported ____ thousand tons	13,794	12,323	11,511	[e]11,600	11,700
Converted ____ thousand 42-gallon barrels	102,806	91,843	85,791	[e]86,455	88,452
Refinery products:[4]					
Gasoline ____ do	42,440	41,514	40,502	[e]40,500	40,000
Jet fuel and kerosine ____ do	7,789	7,463	6,727	[e]6,700	6,500
Distillate fuel oil ____ do	52,324	54,301	55,764	[e]55,500	55,000
Residual fuel oil ____ do	60,912	67,393	68,138	[e]68,000	65,000
Lubricants ____ do	4,669	5,103	4,648	[e]4,500	4,000
Other:					
Liquefied petroleum gas ____ do	2,802	2,285	2,575	[e]2,500	2,000
Asphalt ____ do	4,400	4,218	4,066	[e]4,000	3,500
Total ____ do	175,336	182,277	182,420	[e]181,700	176,000

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Includes data available through Oct. 3, 1983.

[2]In addition to the commodities listed, antimony, asbestos, and a variety of crude construction materials are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Romanian sources do not indicate whether refinery fuel is reported as a part of the listed product yields. Moreover, additional minor products may be produced but are not listed in official sources.

TRADE

In 1982, Romania continued to experience a financial crisis. The country rescheduled its 1981 and 1982 debts with foreign creditors. Total imports and exports declined 24.2% and 9.5%, respectively. Thirty-eight percent of Romania's substantial hard-currency import reduction was accounted for by a drop in crude petroleum purchases designated for reexport as a refinery product, a transaction considered no longer sufficiently profitable. However, imports of petroleum, coal, and nonferrous metals, as a percent of total imports, declined less than other commodities. On balance, Romania's import reductions in 1982 allowed for a $1.5 billion convertible currency surplus.

The inability of Romania's mineral industry to supply raw materials in sufficient quantities to the country's economy required substantial imports of mineral fuels and metallic and nonmetallic ores. The U.S.S.R., a centrally planned economy country, accounted for roughly 18% of Romania's foreign trade and was an important source of iron ore, coke, and a number of other raw materials. In both 1981 and 1982, Romania made appeals to the Council for Mutual Economic Assistance (CMEA),[3] of which it is a member, to play a greater role in supplying raw materials and fuels to its economy.

To diversify its sources of minerals and fuels, in 1982, Romania conducted a wide number of commercial operations with developing countries of Africa, Asia, and Latin America. These operations were conducted by GEOMIN, a foreign trade organization subordinated to the Ministry of Mines. Its broad functions included geological prospecting and exploration, including drilling; mine development, construction, and engineering support; development of cooperative agreements for joint mining and processing of nonferrous metals—especially copper, lead, and zinc—their import and export.

Table 2.—Romania: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	5	1	--	All to Denmark.
Metal including alloys:				
Scrap	4,645	4,630	--	Austria 2,424; France 1,660.
Unwrought	[2]93,800	13,501	503	Japan 6,655; Yugoslavia 1,669; Hungary 1,260.
Semimanufactures	19,650	11,538	2,754	Japan 4,635; Indonesia 1,466; Poland 1,000.
Chromium: Oxides and hydroxides	105	17	17	
Copper: Metal including alloys:				
Scrap	688	1,245	--	West Germany 757; France 454.
Unwrought	1,425	4,009	--	West Germany 3,994.
Semimanufactures	73	89	--	Pakistan 48; Libya 41.
Gold:				
Waste and sweepings value, thousands	NA	$110	--	All to West Germany.
Metal including alloys, unwrought and partly wrought, troy ounces	NA	643	--	Do.

See footnotes at end of table.

Table 2.—Romania: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate, pyrite, roasted	137,899	69,902	--	All to Hungary.
Metal:				
Scrap	260	604	--	Yugoslavia 597.
Pig iron, cast iron, related materials	10,342	10,176	--	Jordan 9,993; Sweden 101.
Ferroalloys:				
Ferrosilicon	NA	138	--	All to West Germany.
Unspecified	5,224	59	--	Austria 53.
Steel, primary forms	293,720	127,640	22	Yugoslavia 62,378; West Germany 19,313; Jordan 18,614.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	[3]664	[3]686	--	Egypt 140; West Germany 95; Yugoslavia 30.
Universals, plates, sheets do	[3]708	[3]745	218	Italy 41; West Germany 38; Canada 20.
Hoop and strip	1,107	33	--	All to Libya.
Rails and accessories	15	223	--	Greece 151; Libya 35; Morocco 21.
Wire thousand tons	[3]166	[3]112	--	West Germany 11; Libya 6; undetermined 86.
Tubes, pipes, fittings do	[2]444	[3]474	62	Poland 56; West Germany 23; undetermined 299.
Castings and forgings, rough do	6	3	--	West Germany 2.
Lead:				
Oxides	--	18	--	All to Jordan.
Metal including alloys:				
Unwrought	425	55	--	All to Libya.
Semimanufactures	3	33	--	Do.
Manganese: Ore and concentrate, metallurgical-grade	1,000	NA		
Metalloids:				
Phosphorus	--	100	--	All to Switzerland.
Unspecified	--	52	--	All to Jordan.
Platinum-group metals:				
Waste and sweepings value, thousands	$148	$240	--	All to West Germany.
Metal including alloys, unwrought and partly wrought do	$58	NA		
Silver:				
Ore and concentrate do	[4]$3,232	NA		
Metal including alloys, unwrought and partly wrought do	$1,692	$2,318	--	West Germany $2,295.
Tin: Metal including alloys:				
Unwrought	--	4	--	All to Libya.
Semimanufactures	--	2	--	Do.
Titanium: Oxides	--	19	--	All to Jordan.
Zinc:				
Blue powder	--	16	--	Do.
Metal including alloys:				
Unwrought	--	2	--	All to Libya.
Semimanufactures	2	2	--	Libya 1; Philippines 1.
Other:				
Oxides and hydroxides	420	42	--	All to Austria.
Ashes and residues	1,658	759	--	Austria 556; West Germany 163.
Cermets	NA	26	--	All to West Germany.
Base metals including alloys, all forms	[2]21,172	44	--	West Germany 26; Sweden 13.
NONMETALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones including diamond value, thousands	$90	$455	--	West Germany $397; Belgium-Luxembourg $58.
Grinding and polishing wheels and stones	11	52	--	Libya 39; West Germany 13.
Asbestos, crude	179	2	--	All to Libya.
Barite and witherite	770	330	--	All to France.

See footnotes at end of table.

Table 2.—Romania: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Boron materials:				
Crude natural borates	--	1	--	All to Libya.
Oxides and acids	225	260	--	All to West Germany.
Cement thousand tons	[2]2,791	[5]3,136	--	Egypt 617; Pakistan 106; undetermined 2,235.
Chalk	--	6	--	All to Libya.
Clays and clay products:				
Crude, unspecified	50	29	--	All to Yugoslavia.
Products:				
Nonrefractory[6]	1,790	9,437	--	Egypt 6,914; Libya 1,787.
Refractory including nonclay brick	62	50	--	Italy 29; Libya 20.
Diamond:				
Gem, not set or strung value, thousands	--	$206	--	All to United Kingdom.
Industrial do	$410	$484	--	Belgium-Luxembourg $439; Switzerland $43.
Fertilizer materials:				
Crude, n.e.s	--	3,800	--	All to Libya.
Manufactured:				
Ammonia	25,518	33,672	--	Yugoslavia 16,098; Austria 12,270.
Nitrogenous thousand tons	[2]1,263	[5]1,125	14	Egypt 273; West Germany 78; France 63; undetermined 479.
Phosphatic	31,756	18,886	--	Hungary 8,189; Egypt 5,603; Yugoslavia 4,969.
Unspecified and mixed thousand tons	[2]1,766	217	--	Thailand 123; Venezuela 46; Yugoslavia 16.
Gypsum and plaster	28,502	NA		
Lime	7,692	20,406	--	Hungary 19,651.
Magnesium compounds: Magnesite	--	22	21	All to Indonesia.
Pigments, mineral: Iron oxides and hydroxides, processed	--	9	--	Greece 5; Morocco 4.
Potassium salts, crude	--	182	--	Hungary 170.
Precious and semiprecious stones other than diamond, natural value, thousands	$4	$13	--	All to Italy.
Pyrite, unroasted	--	2,567	--	Do.
Salt and brine thousand tons	[2]1,025	723	--	Hungary 498; Yugoslavia 224.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,893	1,095	--	Italy 809; West Germany 286.
Sodium carbonate, natural and manufactured	[2]513,000	[5]566,000	--	Hungary 62,762; Czechoslovakia 48,000; undetermined 327,321.
Sodium hydroxide	[2]248,800	[5]295,000	--	Yugoslavia 52,741; Hungary 17,485; undetermined 215,178.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	269	1,352	--	Hungary 1,196; Libya 134.
Worked	[7]21,686	15,051	--	West Germany 12,913; Austria 1,364.
Gravel and crushed rock	4,457	273	--	All to Libya.
Limestone other than dimension	1,230	NA		
Sand other than metal-bearing	16	1	--	All to Libya.
Sulfur:				
Elemental, crude including native and byproduct	--	11	--	Pakistan 10.
Sulfuric acid	294	NA		
Talc, steatite, soapstone, pyrophyllite	145	NA		
Other:				
Crude	1,011	NA		
Slag and dross, not metal-bearing	13,580	10	--	All to Libya.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	10,642	--	West Germany 7,718; Libya 1,983; Austria 519.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	804	--	All to Libya.
Carbon: Carbon black	[2]29,300	14,261	--	Poland 9,488; Czechoslovakia 3,903; Sri Lanka 438.
Coal: Bituminous	--	20,063	--	All to Yugoslavia.
Coke and semicoke	--	31	--	All to Jordan.
Gas, natural million cubic feet	[2]7,084	7,063	--	All to Hungary.
Hydrogen, helium, rare gases	--	39	--	All to Greece.
Peat including briquets and litter	1,835	1,943	--	Austria 1,636; Italy 287.

See footnotes at end of table.

Table 2.—Romania: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	811	162	--	All to Spain.
Refinery products:				
Liquefied petroleum gas do	--	(8)	--	All to West Germany.
Gasoline do	22,886	[5]29,895	5,318	Netherlands 3,953; Spain 2,907; France 2,890.
Mineral jelly and wax do	[2]14	1	--	All to Norway.
Kerosine and jet fuel do	21	16	--	All to Hungary.
Distillate fuel oil do	[2]19,700	[5]16,173	211	Italy 4,481; France 366; Switzerland 172.
Lubricants do	[2]2,164	[5]1,659	--	Austria 351; Italy 149; Yugoslavia 85.
Nonlubricating oils do	NA	8	--	All to Jordan.
Residual fuel oil do	[2]22,768	[5]13,460	--	France 6,997; Sweden 1,636; Belgium-Luxembourg 412.
Bitumen and other residues do	[2]24	23	--	Austria 19; Libya 3.
Petroleum coke do	[2]585	93	--	Italy 82.
Tars and other crude chemicals derived from coal, gas, and petroleum	[2]57,800	26,925	--	Italy 8,877; France 6,796; Hungary 3,903.

[p]Preliminary. NA Not available.

[1]Owing to the lack of official trade data published by Romania, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Official Trade Statistics of Romania.

[3]Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York, United States.

[4]May include waste and sweepings of silver.

[5]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

[6]Excludes exports valued at $249,000 in 1980 and $37,000 in 1981.

[7]Excludes imports by Israel valued at $19,000.

[8]Less than 1/2 unit.

Table 3.—Romania: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	22	(2)	--	Mainly from West Germany.
Aluminum:				
Ore and concentrate thousand tons	1,051	474	--	Greece 377; Yugoslavia 77.
Oxides and hydroxides	22,276	18,538	--	Austria 11,119; Netherlands 4,180; Hungary 2,008.
Metal including alloys:				
Unwrought	1,501	1,590	--	All from Hungary.
Semimanufactures	5,091	3,048	--	Hungary 1,143; West Germany 725; France 439.
Beryllium: Metal including alloys, all forms	--	1	--	All from West Germany.
Bismuth: Metal including alloys, all forms	10	NA		
Cadmium: Metal including alloys, all forms	55	NA		
Chromium:				
Ore and concentrate	2,160	1,191	--	Finland 1,075; West Germany 116.
Oxides and hydroxides	--	270	--	Italy 268.
Metal including alloys, all forms	13	11	--	All from West Germany.
Cobalt:				
Oxides and hydroxides	2	50	--	France 34; United Kingdom 10.
Metal including alloys, all forms	9	23	3	West Germany 14; France 5.
Columbium and tantalum: Metals including alloys, all forms	--	1	--	All from Japan.

See footnotes at end of table.

Table 3.—Romania: Apparent imports of mineral commodities[1]—Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS—Continued				
Copper:				
Ore and concentrate	37,169	[3]14,287	--	Canada 9,287;[3] Peru 5,000.[3]
Oxides and hydroxides	NA	9	--	All from France.
Metal including alloys:				
Scrap	40	NA		
Unwrought	25,018	26,339	--	Chile 10,500;[3] Poland 7,004; Zambia 4,004.[3]
Semimanufactures	13,873	10,632	3	Poland 6,279; West Germany 1,846; France 763.
Gold: Metal including alloys, unwrought and partly wrought, troy ounces	NA	301	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite, thousand tons	[4]15,984	[5]15,016	--	U.S.S.R. 7,384; Liberia 566; Spain 131.
Metal:				
Scrap[5], do	5	--		
Pig iron, cast iron, related materials, do	[4]634	286	--	NA.
Ferroalloys:				
Ferrochromium, do	NA	5	--	France 1; West Germany 1; Sweden 1.
Ferromanganese, do	NA	6	--	All from Spain.
Ferromolybdenum, do	NA	(2)	--	All from West Germany and Sweden.
Ferrosilicomanganese, do	NA	16	--	All from U.S.S.R.
Unspecified, do	[4]145	[5]118	--	NA.
Steel, primary forms[5], do	201	169	--	NA.
Semimanufactures:[5]				
Bars, rods, angles, shapes, sections, do	521	356	--	Poland 124; Hungary 45; West Germany 35.
Universals, plates, sheets, do	261	213	(2)	Bulgaria 21; Spain 17; France 13.
Hoop and strip, do	28	29	(2)	West Germany 21; Hungary 5.
Rails and accessories, do	50	84	--	NA.
Wire, do	70	28	--	West Germany 8; undetermined 18.
Tubes, pipes, fittings, do	[4]126	86	(2)	West Germany 12; Japan 8; Czechoslovakia 5.
Castings and forgings, rough, do	3	3	(2)	NA.
Lead:				
Ore and concentrate	6,320	[6]33,333	--	Spain 8,907; Bolivia 6,167.[6]
Oxides	3,554	2,340	--	All from France.
Metal including alloys:				
Unwrought	10,411	5,004	--	All from Morocco.
Semimanufactures	1	NA		
Magnesium: Metal including alloys:				
Unwrought[7]	199	496	496	
Semimanufactures	261	29	--	Austria 16; United Kingdom 7; West Germany 6.
Manganese:				
Ore and concentrate, metallurgical-grade[5]	216,000	213,000	20	NA.
Oxides	665	808	--	Spain 388; Greece 260; Ireland 160.
Mercury, 76-pound flasks	3,829	261	--	All from Netherlands.
Metalloids:				
Phosphorus	NA	2,041	--	All from U.S.S.R.
Silicon	NA	402	--	Norway 400.
Unspecified	3,517	[8]2,439	--	Italy 1,650; France 789.
Molybdenum: Metal including alloys, all forms	5	1	--	All from West Germany.
Nickel:				
Oxides and hydroxides	NA	11	--	All from Netherlands.
Metal including alloys:				
Unwrought	1,474	200	--	Do.
Semimanufactures	529	[9]247	--	West Germany 136; France 77; Italy 24.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$5,223	$4,020	$1,125	West Germany $1,665; United Kingdom $480; Netherlands $385.
Silver:				
Ore and concentrate, do	$445	$197	--	All from Canada.
Waste and sweepings, do	--	$68	--	United Kingdom $66.
Metal including alloys, unwrought and partly wrought, do	$597	$301	--	France $224; West Germany $63.

See footnotes at end of table.

Table 3.—Romania: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	24,900	NA		
Metal including alloys:				
Unwrought	--	40	--	All from Netherlands.
Semimanufactures	([2])	1	1	
Titanium:				
Oxides	1,816	3,282	--	Yugoslavia 1,340; Spain 1,000; United Kingdom 520.
Metal including alloys, all forms	1	1	--	All from West Germany.
Tungsten: Metal including alloys, all forms	19	13	1	West Germany 6; France 5.
Vanadium: Oxides and hydroxides value, thousands	NA	$160	--	All from Finland.
Zinc:				
Ore and concentrate	579	[6]20,000	--	Bolivia 7,200.[6]
Oxides	5,709	3,083	--	France 2,402; Belgium-Luxembourg 680.
Metal including alloys:				
Unwrought	3,998	8,198	--	Spain 6,998; Poland 1,200.
Semimanufactures	2,649	[10]2,355	--	West Germany 1,010; Belgium-Luxembourg 711; Norway 410.
Zirconium:				
Ore and concentrate	165	95	--	All from West Germany.
Metal including alloys, all forms kilograms	232	NA		
Other:				
Ores and concentrates	[11]122,093	70,005	--	Greece 70,000.
Oxides and hydroxides	316	[12]311	--	Finland 158; West Germany 90; Belgium-Luxembourg 32.
Base metals including alloys, all forms	194	[13]338	--	United Kingdom 133; Belgium-Luxembourg 100; Japan 99.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,983	164	--	All from Italy.
Artificial: Corundum	7,800	5,131	2	Yugoslavia 3,839; France 1,176.
Dust and powder of precious and semi-precious stones including diamond value, thousands	$359	$447	$35	United Kingdom $407.
Grinding and polishing wheels and stones[14]	3,305	2,457	3	Austria 908; Yugoslavia 321; Italy 279.
Asbestos, crude	4,287	2,905	2,809	Yugoslavia 68; Italy 28.
Barite and witherite	20,481	13,560	--	Thailand 9,500; West Germany 4,060.
Boron materials:				
Crude natural borates	23,600	NA		
Oxides and acids	801	460	--	All from Yugoslavia.
Cement	2,219	5,002	--	Hungary 5,000.
Chalk	--	30	--	All from United Kingdom.
Clays and clay products:				
Crude:				
Fire clay	NA	455	--	All from Yugoslavia.
Kaolin	10,125	11,260	--	Hungary 7,000; Spain 2,400; France 1,525.
Unspecified	20,921	4,883	--	Greece 4,000; West Germany 827.
Products:				
Nonrefractory	539	[15]74	([15])	Italy 39; Spain 19; Yugoslavia 14.
Refractory including nonclay brick	[4]151,100	103,270	229	Yugoslavia 31,141; U.S.S.R. 24,139; West Germany 12,998.
Diamond:				
Gem, not set or strung value, thousands	$21	$7	--	All from France.
Industrial do	$6,200	$10,739	--	Belgium-Luxembourg $5,910; United Kingdom $4,705.
Diatomite and other infusorial earth	1,032	1,231	--	Iceland 715; France 511.
Feldspar, fluorspar, related materials:				
Fluorspar	NA	2,930	--	All from Spain.
Unspecified	6,886	90	--	Italy 50; West Germany 40.

See footnotes at end of table.

Table 3.—Romania: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	--	15	--	All from West Germany.
Manufactured:				
Ammonia	--	7	--	Belgium-Luxembourg 6.
Nitrogenous	28	7	--	All from West Germany.
Phosphatic	1,072	32	--	All from Italy.
Potassic[16]	150,000	226,000	--	Mainly from East Germany and U.S.S.R.
Unspecified and mixed	--	103	--	Belgium-Luxembourg 100.
Graphite, natural	70	107	--	All from West Germany.
Gypsum and plaster	--	1	--	All from Yugoslavia.
Halogens:				
Iodine	NA	6	--	All from France.
Unspecified	38	NA		
Lime	6	2	--	Belgium-Luxembourg 1; Switzerland 1.
Magnesium compounds:				
Magnesite	39,138	23,052	--	Czechoslovakia 20,000; Greece 3,000.
Oxides and hydroxides	NA	44	--	All from West Germany.
Other	NA	63	--	All from Austria.
Mica:				
Crude including splittings and waste	41	37	--	All from United Kingdom.
Worked including agglomerated splittings	18	17	--	West Germany 11; France 5.
Phosphates, crude	[4]2,276	1,689	136	Morocco 808; Jordan 684; Tunisia 49.
Pigments, mineral: Iron oxides and hydroxides, processed	827	605	--	West Germany 452; Jordan 119; Italy 33.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$35	NA		
Synthetic do	$6	NA		
Pyrite, unroasted	144,247	NA		
Salt and brine	10	7	--	All from Sweden.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	153	1	--	All from Belgium-Luxembourg.
Sodium hydroxide	24	1	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	19	NA		
Worked	121	58	--	Switzerland 38; Italy 20.
Dolomite, chiefly refractory-grade	12	NA		
Gravel and crushed rock	2,082	987	--	France 967; Yugoslavia 20.
Quartz and quartzite	1,290	1,089	--	West Germany 630; Finland 430.
Sand other than metal-bearing	731	613	27	West Germany 571; United Kingdom 13.
Sulfur:				
Elemental:				
Crude including native and by-product	81,433	375,341	168,690	Poland 192,000; West Germany 14,651.
Colloidal, precipitated, sublimed	122	160	--	All from France.
Dioxide	1,051	NA		
Sulfuric acid	4,956	3,902	--	Poland 2,129; West Germany 1,772.
Talc, steatite, soapstone, pyrophyllite	753	2,645	--	Belgium-Luxembourg 2,251; Italy 394.
Other:				
Crude	2,819	1,773	--	Greece 760; Netherlands 326; Japan 315.
Oxides and hydroxides of barium, magnesium, strontium	--	4	--	United Kingdom 3.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	551	--	United Kingdom 542.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	34	40	--	All from Italy.
Carbon: Carbon black	8,183	242	--	West Germany 227; Italy 10.

See footnotes at end of table.

Table 3.—Romania: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite and bituminous thousand tons	3,163	17	--	All from West Germany.
Bituminous do	NA	1,564	899	Poland 416; Czechoslovakia 249.
Lignite including briquets do	260	29	--	All from Yugoslavia.
Unspecified do	[17]526	NA		
Coke and semicoke do	[4]3,133	[16]3,448	--	Japan 799; United Kingdom 404; Italy 359.
Hydrogen, helium, rare gases million cubic feet	--	7	--	All from Austria.
Peat including briquets and litter	21	70	--	All from Italy.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	[4]116,515	[16]93,912	--	Libya 7,914; Egypt 1,226; undetermined 84,203.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	123,958	62,211	--	Hungary 52,014; West Germany 10,185.
Gasoline do	27,761	11,603	77	Italy 5,848; West Germany 3,511; Greece 2,083.
Mineral jelly and wax do	1,472	4,832	--	Hungary 3,927; West Germany 559.
Kerosine and jet fuel do	2,720	11,424	--	Greece 9,719; Hungary 736; Austria 504.
Distillate fuel oil do	13,495	4,424	--	All from Greece.
Lubricants do	[18]24,591	24,460	277	West Germany 8,008; Greece 6,671; Austria 2,933.
Residual fuel oil do	167,666	140,093	--	Hungary 132,381.
Bitumen and other residues do	4,272	NA		
Bituminous mixtures do	--	42	--	All from France.
Tars and other crude chemicals derived from coal, gas, and petroleum	13,019	15,255	--	U.S.S.R. 14,669; West Germany 545.

[p]Preliminary. NA Not available.

[1]Owing to the lack of official trade data published by Romania, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Less than 1/2 unit.

[3]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.

[4]Official Trade Statistics of Romania.

[5]Source for total trade only: Quarterly Bulletin of Steel Statistics for Europe, United Nations, New York, United States.

[6]Lead and Zinc Statistics, International Lead and Zinc Study Group, London, United Kingdom.

[7]Excludes exports from Norway valued at $112,000 in 1980 and $803,000 in 1981.

[8]Excludes exports from West Germany valued at $112,000.

[9]Exludes exports from Japan valued at $45,000.

[10]Excludes exports from the United Kingdom valued at $64,000.

[11]Excludes exports from Australia valued at $1,483,000.

[12]Excludes exports from Norway valued at $31,000.

[13]Excludes quantity valued at $82,000.

[14]Excludes quantity valued at $1,122,000 in 1980 and $995,000 in 1981.

[15]Excludes exports from the United States valued at $16,000.

[16]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

[17]Presumably largely bituminous; of total officially reported coal imports in 1980, 2,557,000 tons was described as washed pit coal for coke manufacture and 1,392,000 tons was not further described.

[18]Excludes portion of Japanese exports valued at $248,000.

COMMODITY REVIEW

METALS

Continuing depletion of Romania's ferrous and nonferrous reserves remained the salient feature of the metallic mining industry in 1982.

Aluminum and Bauxite.—Reportedly, 350 tons per year of new refined aluminum capacity was added at Slatina Aluminum Enterprise. The industry, centered in Slatina in Olt County, mined less bauxite and smelted less aluminum than in 1981. The country continued to import most of its bauxite raw material requirements from

Greece and agreed to import alumina as well, if and when the Soviet-Greek alumina project in Greece becomes operational.

Copper.—Domestic copper production met about 60% of Romania's consumption requirements. Increasingly lower grade ores were used to obtain 1 ton of copper. In 1970, 128 tons of ore had to be mined to obtain 1 ton of copper; in 1982, this ratio was reportedly 297:1.

Facility expansion programs at the Rosia Poieni Mine in the Rosia Montana area and at the Moldova Noua mining complex in the Banat area were reportedly behind schedule. In September, a 1,000-ton-per-day copper concentrator at Rosia Poieni began trial runs.

Gold.—Gold, as a byproduct, was derived from auriferous polymetallic ores in Rosia Montana in the Apuseni Mountains and in the Banat area. In 1983, it was planned to increase the mining of gold ores by 27,000 tons.

Iron and Steel.—New capacities that were installed during the year included coking batteries and a rolling mill at the Galati iron and steel complex and coking and sintering units at the Calan iron and steelworks. At the Cimpia Turzii steel plant, an electric furnace and a vacuum treatment unit were put into operation, and at the Tirgoviste metallurgical complex, a bar and strip mill was also put into production.

Romania relied on imports for over 75% of its iron ore and metallurgical coke requirements; the U.S.S.R., as in previous years, was Romania's chief supplier of iron ore. Domestic production of ore continued to decline owing to the depletion of the country's reserve base.

The industry was criticized during the year for its inability to efficiently produce special steel. The chief reason was reportedly a wide gap between the qualification of workers and engineers at iron and steel complexes such as Galati and Hunedoara and the skills required to operate the new highly sophisticated plant and equipment that was introduced at these facilities in recent years.[4] Other problems included continuing allegations of dumping stainless steel on European and U.S. markets. It was alleged that Romania sold such steel to the U.S. market at prices as low as 41% below market value.

Romania's plan for 1983 was to produce 14,200,000 tons of carbon steel, a 7.5% increase over the planned output goal of 1982. The production of high-quality carbon steel and alloy and special steel was to increase 2% and 9%, respectively.

In 1982, Romania reduced its commitment to buy iron ore from India from 5 million to 3 million tons for the 1982-83 period, reportedly, because of a shortage of hard currency. In other developments, the U.S. Government agreed to suspend its dumping investigation of Romanian steel on the U.S. market in exchange for Romanian compliance to adjust prices in accordance with twice-yearly U.S. Government advice on the U.S. market value of the exported product.

Lead and Zinc.—Lead-zinc ore was mined and processed at the Baia Mare mining complex; the concentrate was smelted at Copsa Mica in central Romania. Domestic mining satisfied about 75% of lead and 70% of zinc requirements. Low-grade, deep-lying ore bodies made mining increasingly more difficult, and to meet industrial needs, attempts were made to increase secondary output.

NONMETALS

Romania mined and processed a wide variety of nonmetallic minerals primarily for domestic use. These included graphite, feldspar, barite, kaolin, bentonite, sulfur, and other nonmetallics. In addition, the country produced industrial diamonds, which met both domestic and export needs.

Clays (Bentonite).—Bentonite was mined at Gura Sada in the Apuseni Mountains, as well as at Orasul Nou in the Eastern Carpathians and in the Transylvanian Basin. The mineral was used primarily in the steel industry and in drilling mud in the petroleum industry. The annual mine output was in excess of 175,000 tons.

Diamond.—Romania had been producing synthetic diamonds since 1979. Using domestic technology, the Romanian industry produced four grades of diamond: 0.25 to 60 micrometers, used in sprays, pastes, and suspensions; 40 to 250 micrometers, used as friables for processing materials with hard surfaces; a "medium" group (size not reported) that was used in treating glass, ceramics, ferrite, graphite, and reinforced plastics; and 250 to 800 micrometers used in treating building materials. Romania planned to begin large-scale production of diamond tool bits and blades.

Feldspar.—Feldspar was obtained from pegmatites mined at Mutele Rece in the Apuseni Mountains and at Voineasa and Armenis in the South Carpathians Range,

using closed-circuit ball mills with pneumatic classifiers; a flotation unit was installed at Mutele Rece to obtain higher feldspar values. Annual output was in excess of 60,000 tons.[5]

Sulfur.—Mine development continued on the Calimani natural sulfur project at Suceava. The opencast mine, under development, will exploit irregular horizontal ore bodies containing as much as 20% to 23% sulfur. A processing plant, which would use autoclaving and flotation for the production of concentrates, was reported to be in the design stage.

MINERAL FUELS

Coal.—Romania's output goal for 1982 was not met. The industry experienced labor unrest in 1981 and equipment and spare parts delivery shortfalls in 1982. The planned 1983 production goal was 52.2 million tons, up 19% from the planned 1982 goal and up 38% from the actual production level for the year. A new lignite field was also to be developed east of Timisoara, near Lugoj, during the 1981-85 5-year plan period. Mine development continued in 1982 with production planned to reach 500,000 tons per year by 1985.

Nuclear Energy.—The Government decided to initiate the Moldavia nuclear plant project by obtaining three VVEhR-1,000 reactors from the U.S.S.R. This policy, if implemented, would allow the parallel operation of two nuclear technologies in the same country, since the first nuclear plant at Cernavoda was under construction using Canadian reactors.

Petroleum and Natural Gas.—The decline in the country's petroleum production stopped but production did not reach the plan target of 95 million barrels. The plan for 1983 was to increase output to 102 million barrels of petroleum and 1,340 billion cubic feet of natural and associated gas.

In 1982, Romania reported the discovery of a light crude oil deposit near Virteju and Stoenita in Gorj County, at a depth of 4,400 meters. The well, in late 1982, was reportedly producing 1,020 barrels of petroleum and 920,000 cubic feet of gas daily. Twenty-four wells were planned to be put into operation to fully exploit the deposit. Also, the shale mine at Anina was reportedly opened during the year. Annual production capacity was rated at about 12 million tons; the shale would supply a thermal power station under construction in the vicinity.

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[1]Foreign mineral specialist, Division of Foreign Data.

[2]Era Socialista (Bucharest). No. 12, June 20, 1982, pp. 8-10.

[3]Council for Mutual Economic Assistance (CMEA). Its membership includes Bulgaria, Cuba, Czechoslovakia, the German Democratic Republic, Hungary, Mongolia, Poland, Romania, the U.S.S.R., and Vietnam. Yugoslavia obtained permanent observer status in 1965.

[4]Revista Economica (Bucharest). No. 35, Sept. 3, 1982, p. 7.

[5]Industrial Minerals (London). March 1983, p. 37.

The Mineral Industry of Saudi Arabia

By John R. Lewis[1]

As Saudi Arabia's physical infrastructure began to reach completion, the emphasis on where the development budget was to be spent began to shift. Jubail and Yanbu, new industrial cities built to use indigenous oil and gas feedstocks to produce steel, petrochemicals, fertilizer, and refined petroleum products, absorbed a large share of the development expenditures. Saudi Arabia's gross domestic product in 1981 was $153.9 billion, and the per capita income was $19,481.[2] Population, at 9.32 million persons, was growing at an annual rate of about 3.5%. The Kingdom's budget for the year ending June 1983 was balanced at $91.7 billion. Nearly 65% of this budget was appropriated for development projects, while the remaining 35% was for current expenditures. Income from the sale of crude oil and its products provided about 94% of the country's revenue. The budget reflected a 20% or more decrease in oil revenues, which was to be supplemented by $11.7 billion from the General Reserve. According to the latest available foreign trade statistics, Saudi exports in 1981 totaled $118.2 billion, up 12% from that of 1980, while imports amounted to $37.8 billion, about 19% more than in 1980.

The keystone of Saudi Arabia's economy remained its oil. Proven crude reserves at the end of 1982 were 162 billion barrels, about 28% of reserves in market economy countries, or 24% of the reserves of the entire world. Saudi Arabia had more than twice the crude reserves of any other nation in the world. The 1982 world economic slump had little impact upon the country. Although the decline in oil earnings was enough to eliminate any earnings surplus, the nation's financial reserves made necessary only a very small retrenchment in a few elements of the 1980-85 5-year plan.

Except for some cement, there was little else of nonfuel mineral origin that was produced in 1982. At best, it appears that, despite substantial mineral exploration and determination that there is potential for commercial exploitation of tungsten, nickel, iron ore, phosphate, and bauxite, nonfuel mineral production will only play a marginal role in Saudi development. Commercial gold mining was expected to begin in about 3 years at the ancient mine of Mahd Adh Dhahab. Iron ore production will depend upon a pilot mining and enrichment operation underway at Wadi Sawawin on Saudi Arabia's west coast.

PRODUCTION

The production and refining of Saudi Arabia's crude oil and the processing of byproducts, such as sulfur and nitrogenous fertilizers, continued to dominate the nation's economy. Construction of refineries, petrochemical plants, and lubricating oil plants, which had been started in previous years, were progressing about as planned. One petrochemical plant, however, was shelved for the time being when a major partner withdrew, citing low worldwide demand as its reason. Saudi Arabia's crude oil production was off about one-third from that of 1981. This was due in part to reduced world demand. However, Saudi Arabia's determination to maintain the viabilities of

the production and export quotas of the Organization of Petroleum Exporting Countries (OPEC) prompted the country to reduce its own output well below its proportionate share under the OPEC agreement to counter overproduction and lowered prices by certain other OPEC members.

Table 1.—Saudi Arabia: Production of mineral commodities[1]

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Iron and steel: Crude steel thousand metric tons	5	45	50	72	70
NONMETALS					
Cement, hydraulic[2] do	1,800	2,200	3,500	5,000	[3]5,263
Gypsum do	[r]53	[r]75	80	95	[3]91
Lime[e] do	30	150	150	175	170
Nitrogen: N content of ammonia do	140	155	167	170	150
Sulfur:					
Native metric tons	1,083	1,100	1,000	NA	NA
Byproduct, all sources do	14,000	125,000	460,000	480,000	360,000
Total do	15,083	126,100	461,000	480,000	360,000
MINERAL FUELS AND RELATED MATERIALS[4]					
Gas, natural:					
Gross million cubic feet	[r]1,546,409	[r]1,888,752	1,935,407	1,880,071	1,200,000
Marketed[e] do	334,927	400,000	450,000	500,000	400,000
Natural gas liquids: All forms thousand 42-gallon barrels	91,009	100,000	105,000	140,000	100,000
Petroleum and refinery products:					
Crude do	3,029,901	3,479,389	3,613,683	3,579,920	[3]2,309,428
Refinery products:					
Gasoline do	19,716	21,316	26,043	[e]9,000	30,000
Jet fuel do	202	248	355	[e]360	[3]1,670
Kerosine do	9,854	9,913	12,526	[e]12,526	[3]10,244
Distillate fuel oil do	37,486	34,991	44,696	[e]46,000	[3]66,975
Residual fuel oil do	95,423	97,997	89,048	[e]90,000	[3]93,748
Liquefied petroleum gas do	65,326	79,523	97,339	[e]100,000	[3]57,243
Naphtha do	48,285	51,250	45,560	[e]47,000	36,850
Asphalt do	6,178	7,937	8,268	[e]8,300	[3]14,125
Unspecified do	1,085	1,560	1,600	[e]1,700	2,000
Refinery fuel and losses[e] do	10,200	10,200	10,200	10,500	10,000
Total do	293,755	314,935	335,635	[e]325,386	322,855

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 19, 1983.
[2]Data are for the Hejira calendar year, which corresponds closely to the Gregorian calendar year.
[3]Reported figure.
[4]Includes Saudi 1/2 share of production in the Kuwait-Saudi Arabia Partitioned Zone.

TRADE

During 1981, the latest year for which official foreign trade statistics were available, Saudi Arabia's exports totaled $118.2 billion, while imports were $37.8 billion. The estimated trade surplus of $80 billion, represented a 9% increase above the surplus of 1980. However, with drastically reduced petroleum exports in 1982, the surplus was expected to be quite small, and with declining oil income, a deficit was expected in 1983 for the first time since the early 1970's.

In 1981, exports were up 12% over those of 1980. Petroleum and petroleum products constituted 94% of the Kingdom's exports. Japan received 17% of Saudi exports; the United States, 13%; France, 10%; Italy, 7%; and the Netherlands, 6%.

Saudi Arabian imports in 1981 were up 19% over those of 1980. Almost one-half the country's imports came from three countries, the United States, 21%; Japan, 18%; and the Federal Republic of Germany, 10%. Italy, the United Kingdom, and France sold the Kingdom about 19% of its imports. Machinery and electrical equipment made up 25% of 1981 imports, while base metals and their products constituted 15%; transport equipment, 15%; and vegetables and food products, 14%.

Mineral products were the only imports that declined, owing to a decline of 16% in cement imports, reflecting the slowdown in construction activity.

Petroleum was exported in 1981 by three companies. Arabian-American Oil Co.

(Aramco) exported 98% of all crude exported and 95% of refined products. Getty Oil Co. of the United States exported less than 1% of the crude and 3% of the products, and the Arabian Oil Co. (offshore operations—Neutral Zone—Japan-Saudi Arabia) exported 1% of the crude and 2% of the products. Preliminary data for the first half of 1982 indicated that the percentages as reflected by 1981 data were essentially unchanged.

Table 2.—Saudi Arabia: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	7	41	--	Qatar 25; Bahrain 16.
Aluminum:				
Oxides and hydroxides	9	124	--	United Arab Emirates 82; Qatar 42.
Metal including alloys:				
Scrap	2,026	4,122	--	Kuwait 2,196; Pakistan 609; Japan 575.
Unwrought	447	526	--	Kuwait 356; Pakistan 107.
Semimanufactures	419	332	1	Yemen (Sanaa) 140; Kuwait 98.
Beryllium: Metal including alloys, all forms value, thousands	--	$1	--	All to Somalia.
Cobalt: Oxides and hydroxides	20	--		
Copper:				
Matte and speiss including cement copper	802	504	--	India 103; Taiwan 91; West Germany 66.
Metal including alloys:				
Scrap	3,269	6,672	--	Kuwait 2,448; India 1,331; Spain 852.
Unwrought	259	263	--	Pakistan 82; United Arab Emirates 70; Republic of Korea 52.
Semimanufactures	745	35	--	Yemen (Sanaa) 22; Kuwait 6; France 5.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	5,851	--	United Kingdom 4,340; Italy 1,350.
Iron and steel:				
Iron ore and concentrate	1	--		
Metal:				
Scrap	15,931	52,193	--	Italy 13,300; Pakistan 12,132; Taiwan 7,656; Qatar 7,324.
Pig iron, ferroalloys, powder, shot	3,011	872	--	Pakistan 263; Jordan 239; Lebanon 161.
Semimanufactures:				
Bars, rods, angles, shapes, sections	3,473	3,566	--	Yemen (Sanaa) 1,135; Jordan 1,006; Qatar 500.
Universals, plates, sheets	2,432	3,413	42	Yemen (Sanaa) 2,655; Netherlands 416; United Arab Emirates 140.
Hoop and strip	28	32	--	Iraq 26; Netherlands 3.
Rails and accessories	330	83	--	Lebanon 45; Yemen (Sanaa) 20; Iraq 18.
Wire	64	24	--	Yemen (Sanaa) 20; Sudan 4.
Tubes, pipes, fittings	3,763	7,415	274	United Arab Emirates 2,958; Jordan 794; Libya 750.
Castings and forgings, rough	514	372	11	Iraq 95; United Kingdom 57; Libya 52.
Lead:				
Oxides and hydroxides	3	22	--	United Arab Emirates 14; Bahrain 2.
Metal including alloys:				
Scrap	290	22	--	All to Jordan.
Unwrought	52	4	--	All to Kuwait.
Semimanufactures	38	10	--	Iraq 6; Bahrain 1; Lebanon 1.
Manganese: Oxides and hydroxides	--	2	--	All to United Arab Emirates.
Metalloids: Unspecified	215	64	--	United Arab Emirates 49; Bahrain 14.
Nickel:				
Matte and speiss	23	--		
Metal including alloys: Semimanufactures	20	2	--	All to Yemen (Sanaa).
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1	--		
Silver:				
Waste and sweepings[1] do	$3	--		
Metal including alloys, unwrought and partly wrought do	$56,003	--		
Tin: Metal including alloys, unwrought and semimanufactures	1	3	--	All to Yemen (Sanaa).
Titanium: Oxides and hydroxides	--	5	--	All to Bahrain.

See footnotes at end of table.

Table 2.—Saudi Arabia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Tungsten: Metal including alloys, all forms	10	54	--	All to Kuwait.
Zinc:				
Oxides and hydroxides	20	--		
Metal including alloys:				
Scrap	48	9	--	Yemen (Sanaa) 4; Somalia 3; Djibouti 2.
Unwrought	102	218	--	Somalia 203; Italy 7.
Semimanufactures	980	554	--	Yemen (Sanaa) 281; Somalia 251; Ethiopia 17.
Other:				
Ores and concentrates	62	1	--	All to Ethiopia.
Base metals including alloys, all forms	--	10	--	Kuwait 9.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	51	17	--	All to Yemen (Sanaa).
Grinding and polishing wheels and stones	16	27	--	Yemen (Sanaa) 26.
Asbestos, crude	11	21	--	United Arab Emirates 13; West Germany 6.
Boron materials: Crude natural borates	3	--		
Cement	27,409	7,758	--	Yemen (Sanaa) 5,758; Jordan 630; Iraq 442.
Chalk	2	--		
Clays and clay products:				
Crude	226	51	--	United Arab Emirates 26; Qatar 25.
Products:				
Nonrefractory	374	529	--	United Arab Emirates 346; Yemen (Sanaa) 69; Qatar 45.
Refractory including nonclay brick	756	121	--	United Arab Emirates 105; Iraq 6; Yemen (Sanaa) 6.
Diamond: Gem, not set or strung value, thousands	--	$1	--	All to Hong Kong.
Diatomite and other infusorial earth	1,284	163	--	Qatar 108; United Arab Emirates 55.
Fertilizer materials:				
Crude, n.e.s	111	1,120	--	United Arab Emirates 1,031; Iraq 84.
Manufactured:				
Ammonia	61	92	--	United Arab Emirates 88; Kuwait 3.
Nitrogenous	170,908	288,150	--	Iran 59,000; Bangladesh 50,500; Sudan 23,000.
Phosphatic	41,518	3,680	--	Yemen (Sanaa) 3,085; Jordan 570.
Unspecified and mixed	10,001	7	--	Jordan 5; Iraq 2.
Graphite, natural	--	21	--	Yemen (Sanaa) 20; Jordan 1.
Gypsum and plaster	6,127	20,806	--	Kuwait 19,338; Qatar 434.
Halogens	24	--		
Lime	2,311	2,859	--	Yemen (Sanaa) 2,459; Kuwait 75.
Mica: Worked including agglomerated splittings	148	--		
Nitrates, crude	10,023	5,243	--	Sri Lanka 5,000; Qatar 209.
Pigments, mineral: Iron oxides and hydroxides, processed	7	21	--	Qatar 20.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	--	$23	--	All to India.
Synthetic do.	--	$35	--	Do.
Pyrite, unroasted	--	28	--	United Arab Emirates 16; Yemen (Sanaa) 12.
Salt and brine	3,440	6,646	--	Kuwait 4,547; Jordan 800; Iraq 655.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	3	--		
Sodium hydroxide	135	93	--	Iraq 41; United Arab Emirates 40; Kuwait 6.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	120	3,512	19	Kuwait 1,781; France 1,052; Italy 407.
Worked	1,406	634	--	Yemen (Sanaa) 418; Qatar 72.
Dolomite, chiefly refractory-grade	--	24	--	United Arab Emirates 21; Bahrain 3.
Gravel and crushed rock	553	123,285	--	Kuwait 123,198.
Limestone other than dimension	--	30	--	All to Jordan.
Quartz and quartzite	--	14	--	United Arab Emirates 11; Kuwait 3.
Sand other than metal-bearing	164	1,656	--	United Arab Emirates 1,520; Yemen (Sanaa) 45.
Sulfur:				
Elemental, all forms	126	312	--	Yemen (Sanaa) 227; Somalia 52; United Arab Emirates 30.
Sulfuric acid	522	142	--	Qatar 77.

Table 2.—Saudi Arabia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Other:				
Crude	272	287	--	United Arab Emirates 227; Yemen (Sanaa) 54.
Slag and dross, not metal-bearing	26	--		
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	714	1,610	--	United Arab Emirates 1,040; Qatar 12.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	15	24,185	--	United Arab Emirates 22,248; Qatar 922; Yemen (Sanaa) 510.
Carbon: Carbon black	18	6	--	All to Yemen (Sanaa).
Coal:				
Anthracite and bituminous	4,301	459	--	Yemen (Sanaa) 458; Sudan 1.
Lignite including briquets	38	35	--	Yemen (Sanaa) 29; Somalia 6.
Hydrogen, helium, rare gases	86	NA		
Peat including briquets and litter	1	1	--	All to Yemen (Sanaa).
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	r3,375,694	3,298,163	457,239	Japan 522,924; France 321,874; Italy 239,476.
Refinery products:				
Liquefied petroleum gas do	90,637	122,890	6,671	Japan 67,835; Netherlands 11,385; France 9,166; Spain 7,056.
Gasoline do	45,245	45,637	3,817	Japan 21,673; Italy 4,386; France 3,597.
Mineral jelly and wax do	(2)	--		
Kerosine and jet fuel do	164	716	(2)	Sudan 166; France 117; United Arab Emirates 106.
Distillate fuel oil do	4,023	6,044	--	Japan 1,378; Republic of Korea 1,259; Singapore 1,049.
Lubricants do	118	130	--	Netherlands 35; Sudan 24; Hong Kong 21.
Residual fuel oil do	38,968	21,312	--	Singapore 1,536; Japan 1,295; Republic of Korea 602.
Bitumen and bituminous mixtures do	25	171	--	Yemen (Sanaa) 108; United Arab Emirates 63.
Tars and other crude chemicals derived from coal, gas, and petroleum	9,341	71	--	Yemen (Sanaa) 43; Bahrain 27.

rRevised. NA Not available.
[1]May include platinum-group metals.
[2]Less than 1/2 unit.

Table 3.—Saudi Arabia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	1,916	2,799	522	Sweden 1,062; West Germany 507; Netherlands 269.
Aluminum:				
Ore and concentrate	--	39,509	--	All from India.
Oxides and hydroxides	1,269	5,610	2	Netherlands 2,797; West Germany 2,611; India 177.
Metal including alloys:				
Scrap	1,518	206	29	Bahrain 150; Lebanon 14.
Unwrought	7,382	7,852	253	United Kingdom 2,006; Canada 1,477; Bahrain 1,336.
Semimanufactures	41,312	40,444	4,952	Greece 7,490; Republic of Korea 4,562; Bahrain 2,665.
Beryllium: Metal including alloys, all forms	2	35	14	Republic of Korea 9; Lebanon 6.
Chromium: Oxides and hydroxides	19	4	--	France 1; India 1; United Kingdom 1.
Cobalt: Oxides and hydroxides	51	10	1	Netherlands 6; Japan 3.

Table 3.—Saudi Arabia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate	40	--		
Matte and speiss including cement copper	9	(1)	--	All from Italy.
Metal including alloys:				
Scrap	20	1,049	1,036	Yemen (Sanaa) 12.
Unwrought	73	11	--	Netherlands 10.
Semimanufactures	16,633	15,870	3,179	Australia 7,351; West Germany 1,299; United Kingdom 1,055.
Gold: Metal including alloys, unwrought and partly wrought ---troy ounces--	NA	426,768	322	Switzerland 263,700; Netherlands 149,115; Kuwait 5,498.
Iron and steel:				
Iron ore and concentrate, including roasted pyrite	49,128	42,565	27	India 42,503.
Metal:				
Scrap	1,198	424	45	Japan 133; Kuwait 30; Italy 26.
Pig iron, cast iron, related materials	45,780	68,640	258	Greece 20,150; India 19,020; Qatar 13,995.
Ferroalloys	11,680	346	56	India 70; China 34; Hong Kong 33; Japan 33.
Steel, primary forms	91,401	98,999	163	Japan 34,066; Spain 13,278; Republic of Korea 11,549.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	1,805	1,913	21	Japan 844; Republic of Korea 385; Qatar 210.
Universals, plates, sheets	337,379	381,216	25,335	Japan 217,841; West Germany 38,757; Belgium-Luxembourg 33,037.
Hoop and strip	9,698	15,315	1,590	Greece 8,471; Japan 2,089; West Germany 717.
Rails and accessories	11,492	23,421	694	France 9,401; Spain 6,231; West Germany 2,880.
Wire	32,060	30,035	130	Japan 7,249; China 4,219; Republic of Korea 3,857.
Tubes, pipes, fittings	610,352	895,245	100,572	Japan 340,923; Italy 118,788; West Germany 106,199.
Castings and forgings, rough	117,776	145,087	40,468	Japan 20,150; West Germany 19,841; Italy 13,038.
Lead:				
Ore and concentrate	153	97	--	Morocco 80; United Kingdom 15.
Oxides and hydroxides	97	63	--	Cyprus 39; Netherlands 14.
Metal including alloys:				
Scrap	967	171	--	Japan 60; Lebanon 31; Djibouti 27.
Unwrought	1,504	929	84	United Kingdom 243; Lebanon 127; Taiwan 101.
Semimanufactures	3,626	2,347	465	West Germany 736; Lebanon 457; Italy 183.
Magnesium: Metal including alloys:				
Scrap value, thousands	$3	--		
Unwrought	8	13	10	Syria 3.
Semimanufactures	11	4	(1)	Japan 3.
Manganese:				
Ore and concentrate	--	49	49	
Oxides and hydroxides	44	113	16	West Germany 62; United Kingdom 17; Netherlands 12.
Mercury 76-pound flasks	48,850	2,415	1,653	Japan 404; Taiwan 93.
Metalloids: Unspecified	248	308	24	Japan 222; United Kingdom 27.
Molybdenum: Metal including alloys, all forms	28	18	17	Netherlands 1.
Nickel:				
Ore and concentrate	36	--		
Metal including alloys, semimanufactures	200	177	2	Japan 64; Italy 40; Taiwan 22.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$40	$89	--	Switzerland $73; West Germany $15.
Silver:				
Waste and sweepings[2] ---do---	$59	$59	--	Bahrain $56; Thailand $3.
Metal including alloys, unwrought and partly wrought ---do---	$10,215	$3,975	$114	Switzerland $2,044; Netherlands $1,610; Italy $83.

See footnotes at end of table.

Table 3.—Saudi Arabia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tantalum: Metal including alloys, all forms	--	4	2	United Kingdom 1; West Germany 1.
Tin:				
Ore and concentrate	35	--		
Metal including alloys:				
Scrap	9	16	--	Singapore 9; West Germany 6; Netherlands 1.
Unwrought	104	39	(1)	Singapore 27; Malaysia 7.
Semimanufactures	999	2,144	1,912	Japan 98; West Germany 36.
Titanium: Oxides and hydroxides	1,948	2,876	290	Belgium-Luxembourg 683; Italy 616; United Kingdom 361.
Tungsten: Metal including alloys, all forms	149	1	1	
Uranium and/or thorium:				
Ore and concentrate value, thousands	--	$3	$3	
Metal including alloys, all forms do	$28	$51	--	China $42; Italy $8.
Zinc:				
Ore and concentrate	1,017	423	(1)	West Germany 398; Morocco 15; Lebanon 10.
Oxides and hydroxides	1,877	815	95	West Germany 169; Czechoslovakia 123; Spain 103.
Metal including alloys:				
Scrap	19	21	--	West Germany 20; Netherlands 1.
Unwrought	250	1,008	1	West Germany 735; Netherlands 146; France 100.
Semimanufactures	9,831	10,371	281	Japan 6,762; Belgium-Luxembourg 1,472; West Germany 774.
Other:				
Ores and concentrates	730	1,022	123	Belgium-Luxembourg 173; United Kingdom 157; France 135.
Ashes and residues	--	9	--	Italy 8; Japan 1.
Base metals including alloys:				
Scrap	2,221	NA		
Unwrought and semimanufactures	122	134	36	Belgium-Luxembourg 25; West Germany 13; United Kingdom 12.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,055	37,642	19	Spain 37,467; Lebanon 150.
Artificial: Corundum	--	9	--	France 5; Belgium-Luxembourg 4.
Dust and powder of precious and semiprecious stones value, thousands	$5	--		
Grinding and polishing wheels and stones	3,385	3,330	130	Italy 1,891; West Germany 384; Japan 131.
Asbestos, crude	52,225	10,102	232	Botswana 4,362; Canada 2,549; Cyprus 2,463.
Barite and witherite	41,268	26,597	--	Taiwan 26,250; West Germany 166.
Boron materials:				
Crude natural borates	52	--		
Oxides and acids	41	41	--	United Kingdom 37; West Germany 2.
Cement thousand tons	10,579	9,455	56	Spain 3,526; Japan 2,243; Greece 1,946.
Chalk	3,566	3,426	5	Belgium-Luxembourg 1,148; Switzerland 686; United Kingdom 539.
Clays and clay products:				
Crude	6,798	37,832	26,150	India 8,972; United Kingdom 827; Cyprus 720.
Products:				
Nonrefractory	438,183	374,678	7,073	Italy 214,113; Spain 82,976; West Germany 23,853.
Refractory including nonclay brick	78,333	41,880	4,488	West Germany 18,420; Italy 5,947; Japan 4,927.
Cryolite and chiolite	227	81	--	West Germany 40; Netherlands 22; Denmark 17.
Diamond:				
Gem, not set or strung value, thousands	$3,380	$10,288	--	Switzerland $4,409; France $3,262; Lebanon $1,104.
Industrial do	$412	$4,200	$674	Switzerland $1,265; Greece $717; India $615.

See footnotes at end of table.

Table 3.—Saudi Arabia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diatomite and other infusorial earth	15,760	37,297	20,052	United Kingdom 9,003; Greece 6,750.
Feldspar, fluorspar, related materials	445	697	--	Norway 400; West Germany 297.
Fertilizer materials:				
Crude, n.e.s	6,285	30,078	951	Belgium-Luxembourg 15,766; West Germany 5,678; France 1,949.
Manufactured:				
Ammonia	610	691	39	Kuwait 492; United Kingdom 88.
Nitrogenous	10,462	29,378	465	Netherlands 13,554; France 7,642; Finland 2,034.
Phosphatic	27,152	32,965	--	Lebanon 9,850; France 8,957; Finland 4,000.
Potassic	3,780	4,245	979	West Germany 1,231; Netherlands 1,094; Sweden 300.
Unspecified and mixed	7,759	4,556	499	Netherlands 2,241; Canada 581; West Germany 572.
Graphite, natural	14	33	--	West Germany 17; Japan 12.
Gypsum and plaster	26,085	30,834	4,598	Finland 6,676; France 3,455; United Kingdom 3,437.
Halogens:				
Chlorine	670	1,315	254	West Germany 508; India 202; Netherlands 124.
Unspecified	100	141	1	Japan 72; Netherlands 36; West Germany 32.
Lime	30,927	13,333	1,351	Lebanon 7,426; Greece 1,000; Bahrain 472.
Magnesium compounds: Magnesite	95	137	5	West Germany 81; Netherlands 49.
Mica:				
Crude including splittings and waste	1,038	908	--	India 836; Jordan 45.
Worked including agglomerated splittings	32	90	1	Italy 38; West Germany 17; India 16.
Nitrates, crude	4,193	2,058	2	France 1,336; West Germany 438; Netherlands 100.
Phosphates, crude	54	19	--	Netherlands 18; West Germany 1.
Pigments, mineral:				
Natural, crude	NA	4,021	223	West Germany 1,093; U.S.S.R. 1,000; Sweden 483.
Iron oxides and hydroxides, processed	2,018	9,576	21	Qatar 8,910; United Kingdom 268; West Germany 150.
Potassium salts, crude	42	1,292	--	Netherlands 996; West Germany 227; Lebanon 69.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$993	$2,541	--	Switzerland $1,121; Lebanon $901; Taiwan $222.
Synthetic do	$2,050	$1,488	--	India $677; Taiwan $349; Lebanon $38.
Pyrite, unroasted	375	21,123	21,000	Cyprus 94; France 18; Canada 8.
Salt and brine	8,829	14,639	10,764	West Germany 1,305; Netherlands 679.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	7,456	14,703	1	West Germany 12,024; United Kingdom 1,561; France 802.
Sodium hydroxide	11,186	1,919	576	West Germany 1,172; United Kingdom 71.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	92,743	74,974	613	Italy 57,456; Lebanon 3,821; Jordan 3,253.
Worked	451,270	502,388	7,949	Italy 350,064; Greece 36,310; Spain 26,842.
Dolomite, chiefly refractory-grade	2,465	1,786	3	France 1,087; Norway 341; Italy 148.
Gravel and crushed rock	63,372	200,028	1,945	United Arab Emirates 137,169; Italy 44,757; Iran 2,017.
Limestone other than dimension	408	46,127	--	Spain 26,000; India 20,000.
Quartz and quartzite	2,741	1,378	--	Greece 678; Italy 399; West Germany 192.
Sand other than metal-bearing	1,822	6,954	642	West Germany 4,593; Netherlands 546; Japan 496.
Sulfur:				
Elemental:				
Crude including native and by-product	1,003	92	1	Sweden 45; Iran 18; Turkey 14.
Colloidal, precipitated, sublimed	573	1,209	16	Kuwait 906; France 150.
Sulfuric acid	4,579	2,946	406	Netherlands 810; Belgium-Luxembourg 421; Sweden 326.

See footnotes at end of table.

Table 3.—Saudi Arabia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Talc, steatite, soapstone, pyrophyllite	732	954	93	France 374; Finland 150; Italy 98.
Other:				
Crude	69,607	2,234	388	Japan 1,295; West Germany 373.
Slag and dross, not metal-bearing	17,401	258	7	United Kingdom 250.
Oxides and hydroxides of barium, magnesium, strontium	369	596	2	Qatar 540; West Germany 24.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	94,931	106,042	11,627	Japan 17,519; West Germany 13,075; Italy 7,655.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,794	2,195	1,284	Italy 222; Netherlands 145.
Carbon: Carbon black	65	168	89	Belgium-Luxembourg 34; Greece 15.
Coal: All grades including briquets	1,562	2,127	1,123	Japan 789; Belgium-Luxembourg 78; United Kingdom 59.
Coke and semicoke	193	116	9	Lebanon 30; France 14; Jordan 14.
Hydrogen, helium, rare gases	306	286	4	Japan 211; United Kingdom 34.
Peat including briquets and litter	1,217	449	--	West Germany 340; Belgium-Luxembourg 58; Netherlands 22.
Petroleum and refinery products:				
Crude—42-gallon barrels	1,869	5,300	1,463	France 1,062; Singapore 833; United Arab Emirates 508.
Refinery products:				
Liquefied petroleum gas—do	2,517	1,499	250	Italy 362.
Gasoline—do	4,029	965	NA	Singapore 600.
Mineral jelly and wax—do	1,055	1,845	NA	Netherlands 430; West Germany 394; Belgium-Luxembourg 277.
Kerosine and jet fuel—do	167,423	9,283	380	West Germany 3,269; Spain 2,862; Netherlands 1,046.
Distillate fuel oil—do	80,061	17,019	8,907	Belgium-Luxembourg 2,504; United Arab Emirates 2,480.
Lubricants thousand 42-gallon barrels	938	1,158	318	Singapore 267; Netherlands 218; United Kingdom 199.
Nonlubricating oils 42-gallon barrels	NA	173,441	48,414	United Arab Emirates 73,015; Singapore 8,557.
Residual fuel oil—do	8,452	1,337	373	France 961.
Bitumen and other residues, bituminous mixtures—do	68,193	84,666	29,210	United Kingdom 15,387; Kuwait 8,478; France 6,631.
Tars and other crude chemicals derived from coal, gas, and petroleum	2,842	3,912	416	Netherlands 1,505; United Kingdom 849.

NA Not available.
[1]Less than 1/2 unit.
[2]May include platinum-group metals.

COMMODITY REVIEW

METALS

Saudi Arabia's General Petroleum and Mineral Organization (Petromin) was reported[3] by the news agency of OPEC to have contracted with the Royal Dutch/Shell Group to explore zinc deposits in the Umm al-Shalaheeb area, 200 kilometers southwest of Riyadh. The OPEC agency also reported that zinc and copper had been found in the Khanaygiyyat al-Amar region and that tungsten had been discovered at Bayd al-Jimalah, 180 kilometers southwest of Duryadh. Phosphoric sediments were discovered in the Sirhan Turayf Basin, and an extensive layer of bauxite had been found at al-Zabirah, 450 kilometers northwest of Riyadh. The report also added that there were indications of uranium deposits in the northwest Hejaz-Madyan region. At Wadi Oatan, a recent evaluation indicated that a nickel-iron pellet could be produced from the nickeliferous massive sulfides. Further drilling was planned.

India's Royal Corp. was contracted by the Kingdom to set up three silver recovery plants in Saudi Arabia, which were to be financed by private Saudi business interests. The plants will be built in Riyadh, Dammam, and Jedda and will use equipment and technical expertise furnished by the Indian firm. Under a $21 million, 10-year program, each plant will reclaim about 2,400 troy ounces of silver per day from solutions received from the Kingdom's 368 hospitals and 2,800 photographic studios. The silver thus obtained will be refined into pure silver metal and taken to India. The plants were expected to be in operation by the summer of 1983.

Sudan and Saudi Arabia formally signed an agreement early in 1982 to proceed with the joint project to mine minerals, particularly from the muds of the Atlantis II deep in the Red Sea. A pilot mining project will be initiated, based upon technology and equipment already developed. Zinc, copper, and silver worth $3 billion to $3.5 billion are expected to be recovered. Gold, cadmium, and lead also have been found in relatively small quantities in the Atlantis II deep.

Gold.—Petromin continued to press forward on development of the Mahd Adh Dhahab gold project, located 280 kilometers northeast of Jedda. The occurrence of gold, silver, copper, and zinc has been known and sporadically worked at this site since about 1000 B.C. Based upon previous contractual arrangements with Consolidated Gold Fields PLC (Gold Fields) of the United Kingdom, Petromin awarded an interim management contract to Gold Fields to complete the planning of the gold project by late 1983. Under the contract, a wholly owned subsidiary of Gold Fields is to be created bearing the name Gold Fields Mahd Adh Dhahab (GFMAD). GFMAD will make a detailed viability study and prepare engineering designs and contracts for the mine, ore treatment facilities, mine buildings, water and power supplies, and a townsite. Petromin holds the entire equity in the project, and it was reported that Petromin had expressed its intention to conclude a management contract with GFMAD for construction and operation of the mine.[4] Gold Fields stated that proved reserves of ore are sufficient for 10 years of mine operation, with an annual production of 100,000 to 120,000 troy ounces of gold alone. Gold Fields estimated that it would take 4 years to get production underway. GFMAD also had indicated interest in carrying out other mineral development in Saudi Arabia.

Iron and Steel.—Test runs were begun late in 1982, using one module of the newly completed natural gas-based Midrex integrated direct-reduction units at the 800,000-ton-per-year plant of the Saudi Iron and Steel Co. at Jubail. The plant was designated as Hadeed I. The first direct-reduced iron, using Brazilian ore, was produced on December 14, 1982. The second module was expected by its builder to reach the testing stage during the first quarter of 1983. The plant then was planned for onstream operation by March 1983, with both modules of the mill beginning production simultaneously.

Low-grade iron ore was located on the Red Sea coast at Wadi Sawawin, and the contractor, British Steel Corp., was completing a 5-ton-per-day pilot plant at Al Muwaylih, due to start up in October 1983, to examine the economic viability of open pit mining 200 million tons of 42% taconite ore. The plant will also test the U.S. Bureau of Mines selective flocculation-flotation process for enriching oxidized taconites to 65% pelletized iron. It was felt that this process could be competitive with Brazilian iron ore imports.

If the pilot plant operates satisfactorily on the ores available, a 1.8- to 2-million-ton-per-year plant will be built, and the pelletized concentrate from the plant would be shipped to the Jubail steelworks.

Meanwhile, in September 1982, Saudi Arabian steelworkers went to Qatar to receive training in various areas of steel production, marketing, and management at the facilities of the Qatar Steel Co. (Qasco). In all, 120 workers had been trained at Qasco. This activity was in conformance with an agreement between Qasco and the Hadeed management. Another part of the agreement involved exchanges of technical information between the two countries.

NONMETALS

Cement.—Cement production in 1982 was 5,263,000 tons. Several new plants were in various startup phases during the year, and when all were completed, they would add 2,050,000 tons per year to the 6,800,000 tons per year that was in operation before 1982. Other plants under construction and due to be completed in 1984 were expected to add another 3,600,000 tons per year production capacity, making a total capacity by 1984 of just under 12,500,000 tons per year. According to official Saudi Arabian sources,[5] this producing capacity is barely one-half of the Kingdom's requirements for this important construction material. Cement consumption, however, was expected to decline after 1982-84, when many infrastructural projects of the Kingdom reached completion.

The Saudi Kuwait Cement Manufacturing Co., a joint venture with Kuwait, was set up during the year. It will build plants to produce clinker and cement, and it will also participate in cement companies and related projects in other Arab as well as African countries.

Saudi Arabia's planned and operating cement plants are shown in table 4.

Table 4.—Saudi Arabia: Cement industry statistics

Operating company	Plant location	Current capacity (thousand metric tons per year)	Planned capacity (thousand metric tons per year)	Year of completion
Yamama Cement Co	Riyadh	1,400	XX	1979
Yamama Cement Co. (expansion)	do	450	XX	1982
Arabian Cement Co	Jedda	600	XX	1972
Arabian Cement Co. (expansion)	Rabigh	XX	1,200	1984
The Qassim Cement Co	Buraydah	600	XX	1980
Yanbu Cement Co	Yanbu (Ras-Baridi)	1,000	XX	1980
Saudi Cement Corp	Hofuf	1,300	XX	1978
Southern Province Cement Co	Gizan	1,600	XX	1982
Saudi Kuwait Cement Manufacturing Co	Kahfji (Khursaniyah)	XX	2,500	1984
Saudi White Cement Co	Riyadh	XX	200	NA
Saudi Bahraini Cement Co	Ain Dar (Dammam)	1,800	XX	1981
Total		8,750	3,900	

NA Not available. XX Not applicable.

Sources: Saudi Arabian Monetary Agency, Annual Report 1980, p. 76; Saudi Arabia Ministry of Finance and National Economy, Central Department of Statistics, Statistical Indicator, 7th issue, 1982 A.D., tables 5-10.

Sulfur.—Three plants in the Kingdom produced sulfur by extracting it from sour natural gas. At Berri, cutbacks in crude liftings restricted output to 750 tons of sulfur per day. The plant had a recovery capacity of 1,450 tons per day. At Shedgum, rated at 1,650 tons of sulfur per day, production was down to about 1,000 tons per day. The newest plant, at Uthmaniyah, was ready for commissioning in 1981, but facilities at Yanbu to take the sweetened natural gas were not ready. Uthmaniyah was rated at 1,140 tons of sulfur per day, but during 1982 was producing about 600 tons per day. Interim sales arrangements were used to dispose of the sulfur produced. The ultimate plan calls for Petromin to operate a single Polish-process prilling plant at Jubail to treat all the output from the three plants. Liquid sulfur from Shedgum and Uthmaniyah will be trucked, or eventually hauled by rail, to a receiving terminal at Berri, which will be connected by pipeline to the Port of Jubail, 20 kilometers away. Contracts for the prilling tower were awarded, and completion was expected in 1984. Meanwhile, at least 1.5 million tons of sulfur was in stock at Shedgum and Berri.

Sulfur recovery facilities were also being installed in new oil refineries. The Petromin-Petrola refinery at Rabigh was equipped with a 120-ton-per-day sulfur recovery unit in 1982. An additional unit was planned that would recover another 200 tons of sulfur per day at this refinery. The Petromin-Shell refinery, under construction

at Jubail, included three 150-ton-per-day sulfur recovery units, and the Petromin-Mobil Yanbu refinery was to have two more 150-ton-per-day units. Output from the three refineries was expected to serve the export market.

MINERAL FUELS

Natural Gas.—Proven reserves of natural gas in Saudi Arabia rose to 117 trillion cubic feet from 111 trillion cubic feet in the year 1981.

Saudi Arabia's 8,000-mile Master Gas System (MGS) was virtually completed during the year. The project, begun in 1975, is a complete gas gathering, transporting, and processing network for recovering the bulk of the associated gas produced from several very large oilfields. The gas is used as fuel and feedstocks at the industrial complexes of Jubail and Yanbu. Industrial plants and electrical generation and petrochemical complexes throughout the country were also to use the gas, most of which formerly was vented to the atmosphere and burned. Much was to be compressed or otherwise processed into propane, butane, and natural gasoline for export. Completion of the first stage of the MGS gave Saudi Arabia a liquefied gas capacity of 650,000 barrels per day, which has made Petromin the Persian Gulf's liquefied petroleum gas (LPG) price leader. Capacity of the MGS is 3 billion cubic feet of gas per day, but because of crude oil production cutbacks, resulting in less gas being produced, the system was operated at reduced capacity. Petromin was considering adding offshore fields to the network.

On October 5, 1982, a British LPG ship departed from the Port of Yanbu with Yanbu's first shipment of LPG. The cargo of butane and propane was bound for Italy via the Suez Canal. Even though LPG shipped from Yanbu bore a $6 per ton premium, demand from North American and European buyers appeared strong. The gas-exporting pier, built by Aramco, was designed to handle 200 ships annually. The pier had a delivery-into-ship capacity greater than the receiving flow-rate capacity of any LPG tanker yet designed or built.

At midyear, Aramco, drilling at depths between 12,000 and 15,000 feet, discovered gas in a formation beneath the 6,900-foot-deep Ghawar Oilfield. The discovery tested at 50 million cubic feet of low-sulfur gas per day, and additional wells were to be drilled to determine the extent of the reservoir. Located near Haradh, the well was in the southern end of the Ghawar Field. Petromin hailed the discovery because it eased the need to produce excess oil to meet the country's contractual obligations for natural gas and its derivatives.

Petroleum.—*Exploration.*— Estimated proved crude oil reserves, at 162.4 billion barrels, decreased by 4 billion barrels during 1982. The decline appeared partially responsible for Saudi Arabia's continued very active exploration, drilling, and development activity during the year. Although some Middle East countries had cut back on spending on geophysical activity, Saudi Arabia maintained a high level.

During the year, Aramco operated four full-time onshore seismic crews and for 9 months operated a fifth crew. An offshore survey in tidal waters, which was begun in 1981, was completed during 1982, and some deepwater seismic surveying was done in the latter part of the year. In all, 25 exploratory wildcats were drilled and 4 found new oil. Further appraisals were expected before potential reserves could be established. Step-out wells extended oil production of three onshore and two offshore fields.

Production.—The declining world market for oil and OPEC's price rollback of $5 per barrel for benchmark crude to $29.00 per barrel conspired to create significant impacts upon Saudi Arabia's income in 1982. Total annual production was 2.3 billion barrels. According to Saudi Arabia's Ministry of Finance and National Economy, Aramco produced 98% of the Kingdom's oil; Getty Oil, 1%; and Arabian Oil, 1%. Average daily crude oil production in 1982 was 6,484,000 barrels, down 33% from the 1981 daily average of 9,620,000 barrels. These price reductions and production cutbacks reduced Saudi Arabia's income about $100 million daily.

A few capital projects in the Kingdom were canceled; others were delayed, but exploration and development drilling remained at about 200 wells per year. Between Saudi Arabia and neighboring Abu Dhabi, there were 39 rigs drilling in the Persian Gulf, while another 11 rigs were doing workovers in the offshore area. Nevertheless, the majority of the drilling was onshore. As reported by Aramco, a total of 185 wells was drilled by the company as contractor to Petromin; this included 25 exploratory wells. There were 650 flowing oil wells in the country in 1982. There was a total of 48 commercial oilfields in the

country, although all were not producing and virtually none were fully developed.

Onshore, five new gas-oil separator plants were put into operation, one of which was equipped to handle crude containing saltwater. Saltwater separating facilities were added to four other gas-oil separators; compressor facilities for gas produced with oil were installed at one gas-oil separator, and a gas lift compressor plant was inaugurated at the Khurais Field.

In August, Aramco announced commissioning of its 600,000-barrel-per-day Safaniya water-separating facility located on the Persian Gulf, some 270 miles north of Dhahran. The plant was to remove corrosive saltwater from oil produced from offshore fields, prior to sending it to the Ras Tanura terminal complex.

At Safaniya, construction continued on a 16-compressor facility that will move associated gas from offshore Safaniya and Zuluf Fields to the Shedgum gas plant for use in the Eastern Province's sweet gas system. This facility will be able to handle 930 million cubic feet of gas per day.

A $234 million gas-oil separator was to be built at Marjan, which would service two offshore oilfields—Zuluf, which produced medium and heavy crude, and Marjan, which produced medium crude. Throughput capacity was to be 470,000 barrels per day. The plant was described as part of Aramco's plan to expand output for heavy and medium crudes. This was to help Saudi Arabia realize its target in balancing the export mix between light, medium, and heavy crudes.

Refining.—Total refined petroleum output in Saudi Arabia declined slightly during 1982. Refined product output from the Kingdom's five operating refineries was 322,855,000 barrels, down 1% from that of 1981 but up 43% from the product output of 10 years earlier. Product mix in 1982 consisted of motor gasoline and naphtha, 21%; kerosine, 3%; distillate fuel oil, 21%; residual fuel oil, 29%; LPG, 18%; asphalt, 4%; and the remaining refinery products, 4%.

One more refinery, to add to the five already in operation, was completed in late 1982. The 170,000-barrel-per-day refinery, wholly owned by Petromin and located at Yanbu, was completed and ready for operation early in 1983. Foster-Wheeler Corp. of the United States was contracted for 5 years to assist in startup, operation, maintenance, and management of the refinery.

Petromin's Riyadh refinery, after post-expansion startup difficulties were cleared up, was running crude slightly in excess of its throughput capacity. During midyear, the 120,000-barrel-per-day plant was handling 123,000 barrels per day, and the company expected to exceed 130,000 barrels per day shortly thereafter. The expansion work was done by Chiyoda International S.A., the wholly owned subsidiary of the Chiyoda Chemical Engineering & Construction Co. Ltd. of Tokyo, Japan.

Despite these improvements in Saudi Arabia's petroleum-product-supply picture, the Kingdom still contracted with foreign refineries to meet its domestic requirements. Petromin's Jedda refinery contracted with Greece's Petrola Helas AS to process 92,000 barrels of Saudi crude per day at its Elefis refinery. A second contract went to SARAS S.p.A. Raffinerie Sarde for 38,000 barrels per day at its Sarroch, Italy, facility.

A 150,000-barrel-per-day refinery will be built near Buraydah to serve the central province, and a second 150,000-barrel-per-day plant near Gahama would serve the Red Sea coast. The completion of these two refineries will make Saudi Arabia self-sufficient in refined products.

On the Red Sea, at Rabigh, between Jedda and Yanbu, Petromin and Petrola International of Athens, Greece, continued construction of a 325,000-barrel-per-day export refinery. Completion of the first stage was due in 1984. This unit will make fuel oil, diesel fuel, jet fuel, naphtha, and LPG. Petromin was considering adding a lube oil base stock refinery at Rabigh.

At Yanbu, Petromin and Mobil Oil Corp. made a contract with a Japanese firm to build a 250,000-barrel-per-day export refinery, which was due for completion late in 1984. The facility will produce distillates and other light products.

In addition, a number of lube oil plants were under construction or expansion during the year.

Marketing.—All petroleum products sold at retail within Saudi Arabia to individuals are marketed by Petromin. As of July 1982, prices in U.S. cents per Imperial gallon in Riyadh were premium gasoline, 25 cents; regular gasoline, 18.6 cents; diesel fuel, 8 cents; kerosine, 15.7 cents; and diesel fuel to industry, 4 cents. There were no taxes imposed on the sale of any of these products.

Petrochemicals.—Construction was moving ahead during 1982 on a number of

petrochemical plants at either Jubail, in the heart of the Eastern Province's onshore and offshore oil-associated gasfields, or at Yanbu on the western side of the country close to the Red Sea. The Arab world will soon be a major exporter of methanol. Early in 1983, a 600,000-ton-per-year plant at Jubail was to commence production, and another plant, producing 650,000 tons per year, was scheduled for startup in 1984, also at Jubail.

Citing low worldwide demand, The Dow Chemical Co. of the United States withdrew from its joint venture with Saudi Arabian Basic Industries Corp. (SABIC), known as Petrokemya, under which a $1.5 billion petrochemicals complex was to be built at Jubail. SABIC was seeking new partners and had added two more products to the planned output of the plant, polyvinyl chloride, 150,000 tons per year, and vinyl chloride monomer, 250,000 tons per year.

SABIC let two contracts late in 1982 for construction of a $145 million air separation plant at Jubail. Contracts went to the Chiyoda Chemical Engineering & Construction Co. Ltd. of Japan and to Chiyoda Petrostar Ltd. of Saudi Arabia. The plant will make about 400 tons of nitrogen and 1,200 tons of oxygen daily. The nitrogen plant was scheduled for startup in 1984; the oxygen plant was set for a mid-1985 startup.

More than 225 modules, some weighing nearly 2,000 tons, will go into the ethylene-based petrochemical facility being built by Fluor Corp. of the United States for the Saudi Petrochemical Co. at Jubail. The modules were being fabricated in Japan and then shipped some 6,500 miles to Saudi Arabia. After unloading at the docks, the move to the jobsite will utilize a new handling system of transporters and jacks that were developed by Fluor. The plant will be the largest module plant ever built.

A second modular methanol plant for Jubail was being built by the Mitsubishi Chemical Engineering Center in Japan for Saudi Methanol Co. A total of 80 modules in all were to travel, 10 and 11 at a time, on the decks of a vessel owned by Dock Express Shipping BV.

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[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Saudi riyals (SRls) to U.S. dollars at the rate of SRls3.34=US1.00.
[3]An-Nahar Arab Report and Memo (Paris). No. 21, May 24, 1982, p. 7.
[4]Mining Journal (London). Oct. 1, 1982, p. 239.
[5]Saudi Economic Survey. June 23, 1983, p. 6.

The Mineral Industry of Sierra Leone

By Ben A. Kornhauser[1]

Sierra Leone's economy continued to deteriorate, and its budget deficits continued to grow owing to factors such as declining income from exports, shortages of foreign exchange and fuel, rising import prices, and a depressed world economy. The principal earners of foreign exchange were mineral exports of which diamonds accounted for over 50% of such earnings. Undocumented diamond mining and sales also contributed to a loss of foreign exchange earnings. The only new boost to the economy came from bauxite exports that increased in value in fiscal year 1982 to about $11.5 million,[2] 17% more than that of fiscal year 1981.

The Bumbuna hydroelectric project on the Seli River received an additional commitment for $50 million from the International Bank for Reconstruction and Development (World Bank), increasing the total estimated project cost to $352 million. Detailed engineering plans were being drawn. The Mano River Union, composed of Sierra Leone, Liberia, and Guinea, sought funds to develop a hydroelectric project on the Mano River to provide energy for all its members. Completion of one or both of these projects would provide reliable, less costly energy to the mining sector, which relied on diesel generators.

Table 1.—Sierra Leone: Production of mineral commodities[1]

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Aluminum: Bauxite, gross weight thousand metric tons	716	672	766	610	606
Diamond:					
Gem thousand carats	353	419	317	208	147
Industrial do.	426	436	275	97	63
Total do.	779	855	592	305	210
Gold troy ounces	NA	NA	407	3,435	10,033
Iron ore metric tons	--	--	--	--	66,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	394	421	375	343	NA
Jet fuel do.	102	277	306	131	NA
Kerosine do.	213	105	99	213	NA
Distillate fuel oil do.	501	586	533	548	NA
Residual fuel oil do.	412	434	420	383	NA
Liquefied petroleum gas do.	10	7	7	9	NA
Other do.	--	2	2	NA	NA
Refinery fuel and losses do.	43	55	173	88	NA
Total do.	1,675	1,887	1,915	1,715	NA
Salt[e] thousand metric tons	180	200	200	200	200
Titanium: Rutile ore and concentrate, gross weight metric tons	--	10,000	47,497	50,795	47,709

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through June 30, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) is produced, but output is not reported, and available general information is inadequate to make reliable estimates of output levels. Sierra Leone annually refines 4,000 to 10,000 metric tons of salt from imported crude marine salt, but this is not included in the body of the table because it would represent double counting of materials credited to the country where the salt was originally collected. This output would be in addition to that reported in this table.

PRODUCTION AND TRADE

Sierra Leone's earnings from the export of diamond, bauxite, and agricultural products fell about 22% in the year ending June 30, 1982, from the average annual earnings in the preceeding 2 years. To offset this decline, the International Monetary Fund cleared a $22.5 million loan.[3] Weak diamond prices and a drop of over 20% in recorded diamond production from that of fiscal year 1981 reduced the value of fiscal year 1982 diamond exports to about $50 million, about 30% lower than that in fiscal year 1981. The United States was a major recipient of Sierra Leone's diamond, rutile, coffee, and cocoa, purchasing over 30% of the 1981 exports. In 1982, U.S. exports to Sierra Leone totaled $15 million compared with U.S. imports of $35 million.

COMMODITY REVIEW

METALS

Bauxite.—Production of bauxite ore fell to an estimated 600,000 tons. However, the recently installed drying facilities at the Sierra Leone Ore & Metal Co., a subsidiary of Swiss Aluminium Ltd., improved bauxite quality and were responsible largely for an increase in export earnings to $11.5 million, a 17% increase over that of fiscal year 1981.

Gold.—Eurocan Ventures Ltd. (EVL) of Canada reported two potential gold deposits, one minable by open pit in the East Zone of its property and the other minable by adit access in its Central Zone. EVL was discussing mining the deposits as a joint venture with several major mining companies.

Iron Ore.—The Marampa Iron Ore Mining Co. Ltd., wholly owned by the Government of Sierra Leone, officially reopened the Marampa iron ore mines in December 1982. The mines were reactivated and operated by Austromineral GmbH, a subsidiary of the Austrian state-owned firm of Voest-Alpine AG. Production, based on the exploitation of the primary specularite ore and recovery of secondary tailing pond ore averaging 28.6% Fe, was expected to be about 1 million tons annually. The concentrate contained about 64% total iron, 5.6% SiO_2 and 0.9% Al_2O_3, had excellent metallurgical characteristics as a first class sinter-feed material, and was to be exported to Austria. The project created employment for about 700 people.

Titanium.—The Nord Resources Corp. of Ohio in partnership with Glickenhaus and Co., a U.S. firm, acquired the 85% interest held by the Bethlehem Steel Corp. in Sierra Rutile Ltd. (SRL), a producer of titanium dioxide. Nord already owned a 15% interest in the project with which it had been associated since 1971. Production from the operation would be marketed by Bomar Resources Inc. of New York. Past production had been at 50% or less than the annual capacity of 100,000 tons of rutile owing to depressed world markets. About 700 people were employed by SRL.

NONMETALS

Cement.—The Sierra Leone Cement Works, owned 60% by private Sierra Leonean companies and shareholders and 40% by the French Ciments D'Origny, was scheduled to start production in June. The $8 million project was financed by $2.4 million from the private interests, a $2.4 million loan from the International Finance Corp., and a $3.2 million loan from the French Government. The firm employed 50 Sierra Leoneans plus 3 French experts to manage the plant. Annual production capacity was expected to be 120,000 tons of cement, of which 50,000 was to be exported. Most of the raw materials were imported.[4]

Diamond.—The Government and the Sierra Leone Selection Trust (SLST), a subsidiary of British Petroleum Ltd., signed a memorandum of understanding for the underground mining of the kimberlite deposits in the Kono district of the Eastern Province. The agreement granted SLST a mining license until the year 2010 with a renewal option for another 10 years. Under the agreement, the Government owned 60% of the National Diamond Mining Co. (DIMINCO) and SLST held the remaining 40%. The memorandum required an investment of about $100 million, which was expected to come from SLST, the Government, loans from the European Investment Bank, and through buyer-supplier credits.[5] Management of the company continued to be the responsibility of SLST. The expected completion date was 1985. DIMINCO laid

off about 1,800 employees to cut production from alluvial deposits in a period of depressed diamond prices.

Petroleum.—In 1982, exploratory drilling by Mobil Exploration Sierra Leone Ltd. offshore in Sherbro Straits did not produce positive results. However, other firms and the Government still were interested in onshore and offshore exploration.

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[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Leones (Le) to U.S. dollars at the rate of Le1 = US$0.80.
[3]Wall Street Journal. V. 201, No. 34, Feb. 17, 1983, p. 14.
[4]Freetown (Sierra Leone) Daily Mail. June 14, 1982, p. 2.
[5]West Africa (London). Aug. 23, 1982, pp. 2157-2158.

The Mineral Industry of the Republic of South Africa

By Miller W. Ellis[1]

The mineral industry of the Republic of South Africa continued to be the mainstay of the country's economy and to provide approximately 50% of its foreign exchange earnings. The gross domestic product showed an increase of 11% in terms of domestic currency but was equivalent to only $67.2 billion,[2] a decline of approximately 11% in terms of U.S. dollars. The devaluation of the South African rand during the year neutralized the effects of the world's depressed mineral prices and maintained a reasonably prosperous mineral-related segment of the country's industry. The value of the domestic and export sales of raw mineral products was $13.3 billion, a decrease of 16% in U.S. dollar terms but an increase of nearly 6% in South African rands. This was augmented by a substantial amount of mineral-related manufactures such as cement, coke, refined and fabricated metal products, cut gem stones, and fertilizer materials.

Six multinational corporations accounted for most of the mining activity, but the state-controlled South African Iron and Steel Industrial Corp. Ltd. (Iscor) operated its own iron, zinc, and tin mines, and its own colliery and dolomite quarries to provide raw material to its three major iron and steel producing and fabricating plants. The Government-owned Industrial Development Corp. of South Africa Ltd. (IDC) indirectly controlled the Phosphate Development Corp. Ltd. (Foskor) and its downstream fertilizer producers at the Palabora carbonatite deposit in eastern Transvaal Province, and the state-run Alluvial Diamond Diggings at Alexander Bay near the mouth of the Orange River in northwestern Cape Province. Public ownership of the state-initiated South African Coal, Oil and Gas Corp. Ltd. (Sasol) was increased by the purchase of shares in its oil-from-coal operations, and its Sasol III plant was completed southeast of Johannesburg.

The Republic of South Africa's mineral industry supported nearly 750,000 workers. Wages for the unskilled and semiskilled categories have increased about tenfold since 1972, despite the fact that union representation for blacks was not recognized until recently. In March 1982, De Beers Consolidated Mines Ltd., Kimberley Div., recognized that blacks should also be represented by a large "mixed" union, which previously was considered to represent Asians and mixed races as well as whites. In September, the Chamber of Mines of South Africa, the employers' official negotiating body, recognized a nonwhite trade union, representing Asian and mixed race employees, for certain job categories in two gold mines. The Chamber agreed to expand this recognition to other job categories and other mines, and also agreed to allow officials of a new black union to recruit additional members in the mines. At the time, less than 50% of the eligible employees of the two mines had agreed to join the union. Recruitment of additional black members to the National Union of Mineworkers has proceeded slowly, partly because of the varied country and tribal groups represented in the work force. Employee representative groups faced many problems in amalgamating eight existing unions, three organizations representing officials and salaried staff, and the new black unions into an efficient bargaining group.

PRODUCTION AND TRADE

The Republic of South Africa maintained its world leadership in the production of chromite, gem diamonds, gold, platinum, and vanadium, and as one of the top three producers of antimony, asbestos, fluorspar, industrial diamond, manganese ore, uranium, and vermiculite. It remained one of the world's major coal exporters and made slight increases in the production of gold, manganese ore, phosphate rock, tin, and tantalite, but production of chromite decreased 25%; hematitic iron ore, 16%; asbestos, 10%; lead, 9%; silver, 8%; and zinc, 5%.

The $8.12 billion value of gold sales was a decrease of 17% from its 1981 value in terms of U.S. dollars, but an overall increase of 2.6% in domestic value, and indicated an average sale price of $380 per troy ounce. Coal continued to be the second most valuable mineral product with total sales of $2.37 billion including exports of $1.09 billion. Japan and the central European countries were major importers of South African coal as well as chromite, manganese ore, vanadium, and uranium. Diamonds and precious metals were exported chiefly to the United Kingdom, Switzerland, and the United States. Crude petroleum continued to be the country's chief mineral import, but the increasing output of domestic refinery products reflects an increasing amount of synthetic crude available from the Sasol plants and not an increase in crude petroleum imports.

Table 1.—Republic of South Africa: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
METALS					
Aluminum metal	81,100	86,300	86,600	87,000	87,000
Antimony concentrate:					
Gross weight	16,395	20,086	22,372	16,599	15,314
Metal content	9,094	11,657	13,067	9,810	8,525
Beryl concentrate (11% to 12% BeO)	4	1	(2)	122	58
Chromite, gross weight:					
More than 48% Cr_2O_3 thousand tons	33	33	20	36	33
44% to 48% Cr_2O_3 do.	1,524	1,633	1,989	1,561	1,193
Less than 44% Cr_2O_3 do.	1,588	1,631	1,405	1,273	939
Total[3] do.	3,145	3,297	3,414	2,870	2,164
Columbium-tantalum concentrate kilograms	143	765	1,912	3,615	9,960
Copper:					
Mine output, metal content	205,745	190,591	200,683	208,700	207,100
Metal:					
Smelter	191,400	178,000	180,819	199,424	194,000
Refined	149,100	150,757	140,887	144,100	142,800
Gold, primary thousand troy ounces	22,649	22,617	21,669	21,121	21,355
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	24,206	31,565	26,312	28,319	24,554
Iron content do.	15,492	20,202	16,840	18,124	15,714
Metal:					
Pig iron do.	5,910	7,031	7,515	7,365	6,762
Ferroalloys, blast furnace and electric furnace:					
Ferrochromium[e] do.	660	780	800	750	600
Ferromanganese[e] do.	330	560	520	450	440
Ferrosilicon[e] do.	75	149	162	110	100
Ferrosilicomanganese[e] do.	22	45	70	50	40
Ferrosilicochrome[e] do.	23	28	38	20	20
Ferrovanadium[e] do.	(2)	(2)	(2)	(2)	(2)
Total do.	1,110	1,562	1,590	1,380	1,200
Steel, crude do.	7,902	8,868	9,068	9,004	8,271
Semimanufactures:					
For immediate sale do.	r142	r200	207	93	NA
Hot-rolled products do.	r5,593	r6,395	6,568	6,707	NA
Iron castings do.	1,382	r1,928	2,236	2,092	NA
Steel castings and forgings do.	134	r139	72	76	NA
Total do.	r7,251	r8,662	9,083	8,968	NA
Lead:					
Mine output, metal content	—	—	86,059	98,901	90,288
Smelter	23,600	23,300	35,400	26,900	30,400

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
METALS —Continued					
Manganese ore and concentrate, gross weight:					
Metallurgical:					
Over 48% Mn thousand tons	262	296	290	368	442
45% to 48% Mn do	1,131	998	942	1,226	1,423
40% to 45% Mn do	430	763	997	676	713
30% to 40% Mn do	2,357	2,897	3,099	2,429	2,301
Total do	4,180	4,954	5,328	4,699	4,879
Chemical:					
Over 65% MnO_2 do	--	(2)	(2)	(2)	(2)
35% to 65% MnO_2 do	118	153	166	45	39
Less than 35% MnO_2 do	19	76	201	296	295
Total do	137	229	367	341	334
Grand total[3] do	4,317	5,183	5,695	5,040	5,217
Manganiferous iron ore (15% to 30% Mn, 20% to 35% Fe)	95,699	--	--	--	NA
Nickel:					
Mine output, metal content	28,700	30,290	25,700	26,400	e20,600
Metal, electrolytic	22,500	8,040	18,100	17,960	14,425
Platinum-group metals, metal content of concentrate, matte, and refinery products[e 4] thousand troy ounces	2,860	3,017	3,100	3,110	2,600
Silver:					
Mine output, metal content[e] do	3,110	3,240	7,144	7,568	6,943
Primary do	3,104	3,236	3,125	3,050	3,080
Tin:					
Concentrate:					
Gross weight	6,120	5,706	e6,160	e6,950	e7,500
Metal content	2,886	2,697	2,913	2,811	3,035
Metal, primary[5]	637	819	1,100	2,602	2,884
Titanium:					
Rutile concentrate[e]	18,100	41,740	48,000	49,900	47,000
Slag	90,700	286,700	344,000	370,000	381,000
Uranium oxide (U_3O_8)	4,672	5,637	7,295	7,235	6,863
Vanadium:					
Vanadiferous slag, gross weight	54,381	55,000	e60,000	e62,000	e62,000
V content:					
Of vanadiferous slag[e]	7,600	8,400	8,620	8,980	8,540
Of V_2O_5 and vanadate products[e]	3,650	3,900	4,080	3,820	3,460
Total	e11,250	e12,300	12,700	12,800	12,000
Zinc:					
Concentrate:					
Gross weight	130,318	107,646	158,137	174,377	e183,000
Metal content	65,159	53,823	79,068	87,172	91,516
Metal, smelter	79,100	75,400	81,400	87,200	79,700
Zirconium concentrate (baddeleyite and zircon)[e]	36,000	82,000	80,000	100,000	125,000
NONMETALS					
Asbestos:					
Amosite	40,526	39,058	51,646	56,834	43,457
Chrysotile	79,511	91,828	106,940	76,772	81,140
Crocidolite	137,288	118,301	118,148	102,337	87,263
Total	257,325	249,187	276,734	235,943	211,860
Barite	2,355	2,494	2,635	2,247	3,177
Cement, hydraulic thousand tons	6,824	6,900	7,125	8,095	e8,000
Clays:					
Attapulgite	2,773	4,062	3,684	5,221	4,398
Bentonite	34,519	46,394	49,815	44,372	30,827
Fire clay	223,413	310,670	154,967	282,645	259,767
Flint clay	167,285	180,070	190,488	171,500	163,075
Fuller's earth	258	919	720	434	311
Kaolin	122,024	148,740	107,500	155,003	127,891
Montmorillonite	1,299	1,267	1,115	354	--
Corundum, natural	18	74	141	91	62

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
NONMETALS —Continued					
Diamond:					
Gem[e] thousand carats	3,078	3,539	3,403	3,429	3,342
Industrial[e] do	4,649	4,845	5,117	6,097	5,812
Total do	7,727	8,384	8,520	9,526	9,154
Diatomite	930	1,059	584	615	596
Feldspar	52,545	47,416	52,247	57,052	47,854
Fluorspar:					
Acid-grade	297,591	387,305	[e]448,783	451,614	293,821
Ceramic-grade	14,907	8,477	[e]9,823	6,118	9,628
Metallurgical-grade	80,778	55,330	[e]64,112	38,789	27,386
Total	393,276	451,112	522,718	496,521	330,835
Gem stones, semiprecious:					
Emerald crystals kilograms	1,047	1,781	432	502	544
Tiger's-eye do	346,102	212,947	163,157	220,034	112,003
Graphite	583	394			
Gypsum, crude	388,734	377,467	452,490	554,827	534,991
Kyanite-related materials:					
Andalusite	112,040	134,177	196,516	181,272	155,723
Sillimanite	9,540	19,574	16,194	15,504	10,060
Lime[5] thousand tons	1,875	1,721	2,184	2,251	2,150
Magnesite, crude	37,407	65,336	59,975	56,557	31,927
Mica:					
Sheet kilograms	74	64	252		NA
Waste	2,542	3,617	5,046	2,395	1,762
Nitrogen: N content of ammonia thousand tons	563	563	549	552	571
Phosphate rock, gross weight do	2,699	3,221	3,185	2,617	2,815
Pigments, mineral, natural:					
Ochers	1,244	1,244	710	742	1,812
Oxides	943	917	660	555	324
Total	2,187	2,161	1,370	1,297	2,136
Pyrites, gross weight	765,130	910,723	1,450,000	1,475,000	[e]1,500,000
Quartz, quartzite, glass sand (silica) thousand tons	1,013	1,376	1,629	1,387	1,260
Salt	489,925	538,735	567,270	539,801	586,210
Silcrete	5,434	5,783	5,430	9,243	5,582
Stone, n.e.s.:					
Dimension:					
Granite:[5]					
Sawn slabs	9,341	20,471	28,910	23,535	12,595
Rough blocks	203,983	193,563	181,250	182,770	160,000
Marble	6,444	7,562	5,965	6,327	6,725
Crushed and broken:					
Limestone thousand tons	14,112	17,406	19,869	21,107	[e]20,000
Shale do	376	425	604	600	482
Sulfur:					
S content of pyrites do	219	319	493	503	[e]500
Byproduct:					
Of metallurgy[e] do	100	100	100	100	80
Of petroleum[e] do	25	25	25	27	20
Total do	344	444	618	630	600
Sulfuric acid, gross weight[6] do	2,525	3,147	3,616	3,677	3,195
Talc and related materials:					
Talc	7,487	9,451	9,466	9,464	9,743
Pyrophyllite (wonderstone)	5,159	5,795	4,900	5,662	4,070
Vermiculite	209,093	191,573	185,699	190,601	182,641
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	40,000	45,000	45,000	45,000	NA
Coal:					
Anthracite thousand tons	2,150	[r]3,214	3,895	4,017	3,309
Bituminous do	88,208	100,459	111,225	126,403	136,828
Total[3] do	90,358	[r]103,673	115,120	130,421	140,139
Coke, all types do	[r]5,146	[r]5,418	5,680	5,685	NA
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	30,090	30,660	31,390	33,215	
Jet fuel do	2,440	2,555	2,920	2,920	
Kerosine do	3,333	3,285	3,285	3,650	NA
Distillate fuel oil do	32,973	33,580	34,310	35,405	
Residual fuel oil do	22,178	22,630	23,360	24,090	

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum refinery products —Continued					
Lubricants thousand 42-gallon barrels	2,240	2,555	2,555	2,555	NA
Other do	7,372	6,205	6,205	8,395	
Refinery fuel and losses do	5,700	4,015	4,015	5,475	
Total do	106,326	105,485	108,040	115,705	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 15, 1983.
[2]Less than 1/2 unit.
[3]Data may not add to totals shown because of independent rounding.
[4]Includes osmiridium from gold ores estimated at 2,500 troy ounces per year.
[5]Domestic sales plus exports.
[6]Sulfuric acid was produced from gases derived from local smelting operations and from burning imported elemental sulfur.

Table 2.—Republic of South Africa: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Rare-earth metals	351	--	--	
Unspecified value, thousands	--	$2	--	All to Israel.
Aluminum:				
Ore and concentrate	180	72	72	
Oxides and hydroxides	244	31,492	--	All to Venezuela.
Ash and residue containing aluminum	--	92	--	All to Spain.
Metal including alloys:				
Scrap	90	245	--	West Germany 138; Netherlands 71; United Kingdom 36.
Unwrought	7,817	178	--	Japan 99; Norway 44; Taiwan 35.
Semimanufactures	2,672	11,492	--	Sri Lanka 11,450; Israel 33; United Kingdom 5.
Antimony:				
Ore and concentrate	1,937	2,339	533	France 1,566; Belgium-Luxembourg 240.
Oxides	6,393	4,175	4,175	
Beryllium: Ore and concentrate	24	94	94	
Cadmium: Metal including alloys, all forms	--	16	16	
Chromium: Ore and concentrate thousand tons	1,376	1,311	438	Japan 348; West Germany 187; Sweden 104.
Cobalt:				
Oxides and hydroxides	8	14	7	West Germany 7.
Metal including alloys, all forms	35	--		
Columbium and tantalum:				
Ore and concentrate kilograms	[2]4,920	[2]4,061	2,000	NA.
Metal including alloys, all forms, columbium (niobium) do	1	--		
Copper:				
Ore and concentrate	84,909	79,778	--	West Germany 61,903; Japan 17,825.
Matte and speiss including cement copper	88	123	--	All to West Germany.
Ash and residue containing copper	--	2,445	--	West Germany 1,361; Spain 1,084.
Metal including alloys:				
Scrap	1,068	2,848	--	United Kingdom 796; Spain 737; Belgium-Luxembourg 652.
Unwrought	180,423	144,956	66	West Germany 55,176; Belgium-Luxembourg 38,102; Japan 29,549.
Semimanufactures	[3]2,519	1,955	1,204	United Kingdom 218; Israel 124; Netherlands 86.
Gold:				
Waste and sweepings troy ounces	--	[4]1,061	32	West Germany 1,029.
Metal including alloys, unwrought and partly wrought thousand troy ounces	--	963	447	West Germany 226; Netherlands 153; Japan 77.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite -- thousand tons	14,286	12,995	--	Japan 5,765; West Germany 4,155.
Metal:				
Scrap	5,974	1,746	--	Netherlands 776; Italy 286; Japan 253.
Pig iron, cast iron, related materials	[5]92,088	[6]111,409	41,719	Japan 21,016; Spain 15,690; Italy 6,184.
Ferroalloys:				
Ferrochromium	691,394	469,067	238,377	Japan 125,823; West Germany 35,131; France 31,332.
Ferromanganese	288,193	303,324	249,006	Canada 16,344; Italy 15,917; West Germany 6,545.
Ferromolybdenum	--	135	--	West Germany 103; France 32.
Ferronickel	--	12	12	
Ferrosilicochromium	16,433	5,218	2,616	Japan 1,981; Spain 621.
Ferrosilicomanganese	56,269	46,610	23,185	West Germany 10,714; Italy 6,517; Canada 4,563.
Ferrosilicon	22,778	12,378	1,695	Japan 8,889; West Germany 1,707.
Unspecified	42,032	77,188	--	United Kingdom 41,530; Japan 19,085.
Steel, primary forms	203,840	43,202	9,718	Taiwan 12,600; Argentina 10,110.
Semimanufactures:				
Bars, rods, angles, shapes, sections	486,986	[7]351,987	128,540	United Kingdom 67,019; Sri Lanka 53,515; Canada 41,678.
Universals, plates, sheets	524,660	[8]447,500	128,093	Taiwan 149,832; Canada 33,220; United Kingdom 32,343.
Hoop and strip	1,885	[9]5,017	--	Sri Lanka 3,976; Taiwan 368.
Rails and accessories	7,702	151	--	Taiwan 150; Argentina 1.
Wire	17,396	[10]10,248	2,551	Sri Lanka 3,623; Israel 1,600; Argentina 692.
Tubes, pipes, fittings	68,849	[11]63,733	49,956	United Kingdom 10,546; Sri Lanka 1,402; United Kingdom 1,315.
Castings and forgings, rough	115	23	3	Canada 8; Netherlands 4; Saudi Arabia 4.
Unspecified	([12])	77,188	--	United Kingdom 41,530; Japan 19,085; Venezuela 3,196.
Lead:				
Ore and concentrate	84,512	145,404	--	France 49,658; Canada 30,080; Japan 23,297.
Oxides	88	131	--	Australia 31; France 17; United Kingdom 13.
Metal including alloys:				
Scrap	735	368	--	West Germany 360; United Kingdom 8.
Unwrought	24,360	18,160	--	Italy 13,818; Japan 4,227.
Semimanufactures	58	80	--	United Kingdom 78.
Magnesium: Metal including alloys:				
Scrap	281	[13]152	19	Austria 133.
Unwrought	1	16	--	All to Norway.
Semimanufactures value, thousands	--	$212	--	All to Australia.
Manganese:				
Ore and concentrate, metallurgical-grade thousand tons	3,428	2,912	206	Japan 1,361; West Germany 360; France 345.
Oxides	500	292	--	Portugal 110; Finland 85.
Metal including alloys, all forms	21,797	24,605	7,480	Canada 9,684; Netherlands 2,577.
Metalloids:				
Arsenic, oxides and acids	--	17	17	
Phosphorus	--	401	--	All to Switzerland.
Silicon	--	9,728	4,193	West Germany 3,378; Netherlands 1,394.
Unspecified	25,321	11,547	--	Japan 6,554; Australia 3,255; Canada 1,122.
Molybdenum: Metal including alloys, all forms	--	47	47	
Nickel:				
Ore and concentrate	48,319	74,095	72,154	Canada 1,936.
Matte and speiss	3,998	3,611	--	Norway 3,430; Spain 70.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel —Continued				
Metal including alloys:				
Scrap	1,648	1,989	10	Canada 1,936; United Kingdom 26.
Unwrought	21,815	[14]15,566	3,949	Italy 2,667; West Germany 2,189; France 1,812.
Semimanufactures	1,081	1,116	740	Sweden 310; Argentina 14; Switzerland 14.
Platinum-group metals: Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	NA	766,461	581,799	Japan 180,032; France 3,633.
Platinum do	NA	1,500,129	868,133	Japan 558,050; West Germany 54,045.
Rhodium do	NA	66,543	52,888	Japan 13,655.
Iridium, osmium, ruthenium do	NA	122,921	105,744	Japan 17,177.
Unspecified value, thousands	$1,099,629	$32,575	$540	United Kingdom $13,771; Switzerland $10,590; Italy $5,135.
Silver:				
Ore and concentrate[15] do	$36,600	$11,614	$301	Canada $8,889; Spain $2,424.
Waste and sweepings[15] do	$275,079	[16]$1	$1	
Metal including alloys, unwrought and partly wrought do	$53,470	$24,538	$306	United Kingdom $22,481; West Germany $1,213.
Tin:				
Ore and concentrate	2,757	2,174	--	United Kingdom 2,172; Australia 2.
Ash and residue containing tin	--	83	--	West Germany 77; Spain 6.
Metal including alloys:				
Scrap	([17])	20	--	All to Sri Lanka.
Unwrought	1,250	759	34	United Kingdom 402; Italy 292.
Semimanufactures	30	[18]3	--	United Kingdom 3.
Titanium:				
Ore and concentrate	54,367	139,611	64,544	France 61,747; Netherlands 3,929.
Oxides	1,142	15	--	All to Hong Kong.
Metal including alloys, ash and residue containing titanium	r44,923	86,680	20,579	Japan 66,086.
Tungsten:				
Ore and concentrate	24	21	--	All to West Germany.
Metal including alloys, scrap	--	3,303	3,303	
Uranium and/or thorium:				
Ore and concentrate value, thousands	--	$52,367	--	Mainly to Canada.
Oxides and other compounds	--	1,533	1,533	
Vanadium:				
Oxides and hydroxides	3,949	3,995	382	Japan 2,848; Belgium-Luxembourg 487.
Ash and residue containing vanadium	--	11,140	10,840	Netherlands 300.
Zinc:				
Ore and concentrate	52,846	42,781	([19])	West Germany 40,545.
Oxides	365	7	--	All to Sri Lanka.
Metal including alloys:				
Unwrought	100	994	994	
Semimanufactures	49	34	12	Portugal 15; Ireland 7.
Zirconium: Ore and concentrate	83,258	85,059	15,186	West Germany 24,132; Japan 20,359.
Other:				
Ores and concentrates	15,636	51,027	7,187	Canada 33,281; Switzerland 3,690; Venezuela 2,013.
Oxides and hydroxides	5,649	--	--	
Ashes and residues	202,771	100,322	1,561	Italy 83,915; Austria 13,118.
Base metals including alloys, all forms	12,662	[20]6,557	308	Sweden 1,761; France 1,169; United Kingdom 912.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	531	1,516	([21])	Canada 1,481; Taiwan 33.
Dust and powder of precious and semi-precious stones, excluding diamond value, thousands	$10,019	$6,869	$2,645	France $3,503; West Germany $441.
Grinding and polishing wheels and stones do	([22])	[23]$31	$2	New Zealand $19; Israel $5.
Asbestos, crude	330,730	194,975	17,114	Japan 51,958; Italy 23,406; Taiwan 11,852.
Barite and witherite	500	3,293	--	Venezuela 3,284; Canada 9.
Cement	115,135	[24]57,220	65	Reunion 57,144.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	r [2]106,786	[2]60,047	4	NA.
Bentonite	[2]1,630	[2]1,798	NA	NA.
Chamotte earth	2,868	NA		
Kaolin	[2]1,798	[2]1,346	NA	NA.
Unspecified	128,378	106,797	--	Japan 45,500; West Germany 21,797; Australia 16,201.
Products:				
Nonrefractory	10,059	1,031	368	Belgium-Luxembourg 352; Hong Kong 291.
Refractory including nonclay brick	30,164	[2]23,886	599	Italy 11,249; Australia 7,639.
Cryolite and chiolite	351	NA		
Diamond:				
Gem, not set or strung value, thousands	$1,362,800	$574,837	$358,623	Hong Kong $65,461; United Kingdom $57,332; Japan $14,603.
Industrial do	$74,404	$63,198	$46,340	West Germany $6,978; Japan $4,982; Australia $2,202.
Feldspar, fluorspar, related materials:				
Unspecified	498,446	399,775	223,326	Japan 77,150; West Germany 28,809; Canada 27,515.
Fertilizer materials:				
Crude, n.e.s	108,346	3,255	--	West Germany 2,702; France 301.
Manufactured:				
Ammonia	1	--		
Nitrogenous	20	197	--	Sri Lanka 175; West Germany 22.
Phosphatic	15,593	10,624	--	West Germany 7,514; Denmark 1,636.
Unspecified and mixed	14,777	422	--	Mainly to West Germany.
Graphite, natural	967	541	219	United Kingdom 322.
Gypsum and plaster	[2]1,092	[2]2,604	NA	NA.
Halogens: Chlorine	--	2	--	All to United Kingdom.
Lime	[2]78,599	[2]68,908	107	NA.
Magnesium compounds: Magnesite	458	2,513	--	West Germany 2,274; Austria 233.
Mica:				
Crude including splittings and waste	--	973	--	United Kingdom 436; West Germany 343.
Worked including agglomerated splittings	1,601	--		
Pigments, mineral:				
Natural, crude	r [2]--	[2]18	NA	NA.
Iron oxides and hydroxides, processed	[2]18	18	--	All to Taiwan.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$13,691	$11,500	$3,429	Switzerland $3,309; West Germany $1,494; United Kingdom $1,453.
Synthetic do	$69	$17	$13	Canada $2.
Pyrite, unroasted	[2]47,181	7	--	All to Sweden.
Salt and brine	[2]53,745	[2]54,554	NA	NA.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	18	--		
Sodium carbonate, natural and manufactured	NA	--		
Sodium hydroxide	1	--		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	1,099	753	453	Italy 70; France 68; Japan 38.
Worked do	[2]197	[2]197	NA	NA.
Gravel and crushed rock	5,701	636	133	Mainly to Netherlands.
Limestone other than dimension	NA	54	36	United Kingdom 18.
Quartz and quartzite	3,648	943	1	Netherlands 658; West Germany 167.
Sand other than metal-bearing	11,540	9,661	1,159	Belgium-Luxembourg 6,973; United Kingdom 1,159.
Sulfur:				
Elemental:				
Crude including native and byproduct	138	--		
Colloidal, precipitated, sublimed	NA	--		
Sulfuric acid	5	--		
Talc, steatite, soapstone, pyrophyllite	[2]500	NA		

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Vermiculite	[2]156,072	[2]184,152	NA	France 26,657; West Germany 12,157.
Other:				
Crude	--	73,114	([26])	United Kingdom 33,252; Italy 10,465.
Slag and dross, not metal-bearing	118,725	66,765	--	Japan 66,086.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	173	([27])	All to United Kingdom.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	1,019	2,455	--	Do.
Coal:				
Anthracite and bituminous thousand tons	[2]29,150	[2]29,882	739	France 7,583; Japan 4,277; Italy 4,274.
Briquets of anthracite and bituminous coal	174	86,088	--	All to Italy.
Lignite including briquets	99	7	--	All to West Germany.
Coke and semicoke	194	3,847	--	Belgium-Luxembourg 3,527; Sri Lanka 320.
Peat including briquets and litter	39	64	64	
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	9	--		
Gasoline do	([21])	NA		
Mineral jelly and wax do	186	184	107	West Germany 36; France 14.
Distillate fuel oil do	206	NA		
Lubricants do	197	3,006	16	Taiwan 2,966; Colombia 14.
Residual fuel oil do	1,038	1,283	--	Switzerland 791; Spain 483.
Bitumen and other residues do	57	60	--	Reunion 55; Italy 4.
Unspecified do	--	41	--	West Germany 14; Colombia 7.
Tars and other crude chemicals derived from coal, gas, and petroleum	7,284	11,707	1,002	United Kingdom 10,521; Argentina 163.

[r]Revised. NA Not available.

[1]Because official South African trade statistics provide data only on the value of total exports of each commodity class (with no data on destinations) and not on quantity of material exported, this table has been compiled from a variety of sources including the quarterly publication "Minerals" issued by the Department of Mines (issues for 1980 and 1981) as well as official trade returns of trading partner countries. Data from "Minerals" is footnoted; other figures are compiled from a variety of sources with specifics on destination obtained from the import statistics of the countries listed. Data presented are exports by the common customs areas of Botswana, Lesotho, the Republic of South Africa, and Swaziland.

[2]"Minerals" Quarterly of the South African Department of Mines. Figures are shipments by producers for export and are not necessarily actual exports.

[3]Total excludes unreported quantities valued at $48,000 to Israel and $15,000 to Uruguay.

[4]Total excludes unreported quantity to Israel valued at $234,000.

[5]Total excludes unreported quantities valued at $58,000 to Uruguay and $16,000 to Israel.

[6]Total excludes unreported quantity to Israel valued at $7,000.

[7]Total excludes unreported quantities to Australia (partial) valued at $1,537,000; Israel—$20,963,000; Japan—$2,000; Switzerland—$1,000; and Sweden—$2,000.

[8]Total excludes partial unreported quantity to Australia valued at $301,000.

[9]Total excludes unreported quantity to Australia valued at $2,000.

[10]Total excludes unreported quantities to Australia (partial) valued at $141,000 and United Kingdom valued at $4,000.

[11]Total excludes unreported quantities to Australia valued at $302,000 and Canada valued at $1,023,000.

[12]Value only reported at $28,023,000.

[13]Total excludes unreported quantity to Israel valued at $99,000.

[14]Total excludes unreported quantity to Australia valued at $223,000.

[15]May include platinum-group metals.

[16]Excludes unreported values of 12,507 troy ounces to Canada and 67,516 troy ounces to France.

[17]Unreported quantity valued at $20,000.

[18]Excludes unreported quantity to Greece valued at $15,000.

[19]Unreported quantity valued at $48,000.

[20]Total excludes unreported quantities to Australia valued at $2,363,000; Canada—$10,031,000; Israel—$8,000; Japan—$3,552,000; and New Zealand—$43,000.

[21]Less than 1/2 unit.

[22]Quantity reported at 76 metric tons.

[23]Excludes unreported values to Canada of 12 metric tons and Australia 5 metric tons.

[24]Excludes unreported quantity to Australia valued at $12,000.

[25]Excludes unreported quantities to Hong Kong valued at $446,000 and to New Zealand valued at $2,089,000.

[26]Value only reported at $4,469.

[27]Value only reported at $768,000.

Table 3.—Republic of South Africa: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium, ore and concentrate	5,327	870	--	NA.
Unspecified	29	36	--	West Germany 16; United Kingdom 16; France 4.
Aluminum:				
Ore and concentrate	24,742	15,304	--	Australia 10,182; West Germany 2,914; Japan 162.
Oxides and hydroxides	164,725	180,066	288	Australia 167,542; United Kingdom 5,272; Japan 3,012.
Metal including alloys:				
Scrap	1,809	9,160	4,710	United Kingdom 1,529; West Germany 832; Australia 543.
Unwrought	282	2,417	249	West Germany 808; Switzerland 510; United Kingdom 361.
Semimanufactures	12,668	15,574	4,210	West Germany 5,438; Japan 1,537; United Kingdom 1,384.
Beryllium: Metal including alloys, all forms value	$24,121	$487	--	NA.
Chromium:				
Ore and concentrate	7,430	8,147	--	NA.
Oxides and hydroxides	470	566	124	West Germany 350; Italy 52; Japan 11.
Cobalt:				
Oxides and hydroxides	12	15	--	Australia 6; United Kingdom 4; Canada 1.
Metal including alloys, all forms	100	82	25	Belgium 15; Japan 7; Sweden 6.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	1,100	1,200	800	NA.
Copper:				
Ore and concentrate	2,972	2,040	--	Australia 1,984.
Metal including alloys:				
Scrap	286	376	33	United Kingdom 78.
Unwrought	9,013	5,180	(2)	Australia 776; Belgium 573; Chile 200.
Semimanufactures	r5,601	14,878	294	West Germany 8,846; United Kingdom 1,880; Belgium 1,479.
Gold:				
Waste and sweepings value	r$668,806	$988,425	$168,315	United Kingdom $626,871; Australia $175,807.
Metal including alloys, unwrought and partly wrought troy ounces	6,151	8,798	279	United Kingdom 5,659; France 1,910; Switzerland 432.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	(3)	38	--	NA.
Pyrite, roasted	(3)	--		
Metal:				
Scrap	27,922	12,462	(4)	United Kingdom 3,146.
Pig iron, cast iron, related materials	31,136	22,476	1,105	Sweden 2,332; United Kingdom 434; West Germany 180.
Ferroalloys:				
Ferrochromium	6,973	6,027	9	Sweden 55; United Kingdom 20.
Ferromanganese	242	300	--	West Germany 191; United Kingdom 102.
Ferrosilicon	1,824	2,601	15	France 1,265; Brazil 589; West Germany 472.
Unspecified	2,009	968	61	Belgium 325; United Kingdom 214; France 125.
Steel, primary forms	6,836	14,688	17	West Germany 642; France 359.
Semimanufactures:				
Bars, rods, angles, shapes, sections	35,410	48,871	581	United Kingdom 12,045; Japan 5,572; West Germany 4,501.
Universals, plates, sheets	r56,593	59,416	1,286	Japan 30,729; West Germany 14,383; Italy 6,212.
Hoop and strip	14,489	18,078	677	Japan 6,174; West Germany 3,371; United Kingdom 2,189.
Rails and accessories	1,947	1,788	--	West Germany 486.
Wire	25,510	35,333	830	Belgium 3,909; United Kingdom 3,282; Italy 2,283.
Tubes, pipes, fittings	82,380	73,372	1,806	Japan 35,515; West Germany 11,454; United Kingdom 5,588.
Castings and forgings, rough	537	675	190	United Kingdom 218; West Germany 96; Austria 29.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	950	17	17	
Oxides	35	27	6	United Kingdom 13; West Germany 5.
Metal including alloys:				
Scrap	6,212	7,752	5,205	United Kingdom 1,611; Sri Lanka 200.
Unwrought	9,303	9,405	2,909	United Kingdom 1,921; Brazil 478; Peru 100.
Semimanufactures	33	85	(2)	United Kingdom 62; West Germany 10.
Magnesium: Metal including alloys:				
Scrap	40	23	--	NA.
Unwrought	600	500	499	Italy 1.
Semimanufactures	87	62	51	Austria 4.
Manganese:				
Ore and concentrate	3,972	7,052	--	United Kingdom 5,821; Belgium 545.
Oxides	4,560	6,213	2	Belgium 5,309; Greece 718.
Mercury 76-pound flasks	2,988	2,735	90	Spain 2,013; Turkey 145; Japan 128.
Metalloids:				
Arsenic:				
Oxides and acids	1	--		
Metal including alloys, all forms	12	12	5	Sweden 7.
Boron including alloys, all forms kilograms	100	100	100	
Phosphorus	50	53	--	All from United Kingdom.
Selenium	1	9	1	United Kingdom 6.
Silicon	16	81	--	United Kingdom 36; France 27; Netherlands 17.
Tellurium value	$114,358	$3,519	--	NA.
Molybdenum:				
Oxides and hydroxides	312	170	--	United Kingdom 57; West Germany 46; Chile 40.
Metal including alloys, all forms	19	10	4	Netherlands 4; Austria 1.
Nickel:				
Ore and concentrate	--	5	--	NA.
Matte and speiss	(3)	150	--	All from Canada.
Metal including alloys:				
Scrap	89	27	24	United Kingdom 2.
Unwrought	542	522	2	Japan 27; United Kingdom 16.
Semimanufactures	850	748	32	West Germany 189; United Kingdom 178; Japan 151.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified troy ounces	22,977	26,053	390	United Kingdom 12,091; West Germany 6,749; Belgium 3,280.
Silver:				
Waste and sweepings[5] value	r$686,192	$784,158	--	Italy $327,366.
Metal including alloys, unwrought and partly wrought troy ounces	776,060	834,458	(2)	United Kingdom 7,700; West Germany 6,774.
Tin:				
Ore and concentrate	--	89	--	NA.
Metal including alloys:				
Scrap	149	352	--	NA.
Unwrought	225	276	--	United Kingdom 33; Switzerland 18.
Semimanufactures	20	23	1	West Germany 14; United Kingdom 4.
Titanium:				
Ore and concentrate	50	43	--	West Germany 38.
Oxides	1,529	1,731	819	West Germany 428; France 213; Spain 198.
Tungsten:				
Ore and concentrate	2,504	400	18	Canada 143; Australia 108.
Metal including alloys, all forms	176	39	3	Ireland 22; United Kingdom 4.
Zinc:				
Ore and concentrate	(3)	--		
Oxides	391	803	1	West Germany 333; Belgium 226; United Kingdom 116.
Metal including alloys:				
Scrap	132	1,160	NA	West Germany 368; United Kingdom 206.
Unwrought	1,825	8,287	NA	NA.
Semimanufactures	1,522	709	(2)	United Kingdom 209; Belgium 188; France 181.
Zirconium: Ore and concentrate	49	140	--	All from Japan.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Other:				
Ores and concentrates:				
Of precious metals excluding gold value, thousands	$85,045	$45,560	--	All from Norway.
Of base metals	242	147	144	NA.
Oxides and hydroxides	r886	1,027	94	United Kingdom 386; Belgium 125; West Germany 125.
Ashes and residues	3,092	8,455	--	West Germany 2,163; Netherlands 2,117; United Kingdom 1,408.
Pyrophoric alloys	17	9	3	West Germany 2; Austria 1; Japan 1.
Base metals including alloys, all forms	528	437	39	United Kingdom 212; France 78; West Germany 12.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	11,110	3,875	120	Greece 70; Netherlands 44.
Artificial:				
Corundum	6,146	5,285	2,016	West Germany 1,798; United Kingdom 603; France 456.
Silicon carbide	3,390	3,043	204	Norway 1,846; West Germany 483; Netherlands 219.
Dust and powder of precious and semiprecious stones, value	r$353,919	$347,656	(2)	United Kingdom $304,399; Belgium $23,714; West Germany $12,254.
Grinding and polishing wheels and stones	658	657	54	West Germany 113; United Kingdom 92; Spain 77.
Asbestos, crude	19,518	29,231	19	Canada 1,144.
Barite and witherite	r5,672	3,693	--	United Kingdom 863; West Germany 351; Australia 300.
Boron materials:				
Crude natural borates	1,716	4,250	1,520	United Kingdom 1,734; Netherlands 946.
Oxides and acids	1,179	722	69	France 601.
Cement	95,503	124,586	24	Taiwan 29,000; France 11,512; United Kingdom 3,481.
Chalk	7,016	9,877	57	France 7,235; Sweden 2,280.
Clays and clay products:				
Crude, unspecified	29,627	33,072	24,384	United Kingdom 5,500; West Germany 553.
Products:				
Nonrefractory[6]	34,407	39,941	70	Italy 12,324; United Kingdom 7,282.
Refractory including nonclay brick	r22,638	37,377	2,298	West Germany 17,284; Austria 3,751; United Kingdom 3,334.
Cryolite and chiolite	171	160	4	Denmark 78; West Germany 59.
Diamond:				
Gem, not set or strung, thousand carats	159	166	(7)	Belgium 44; Switzerland 37; Israel 20.
Industrial, do	2,344	2,144	18	United Kingdom 1,473; Ireland 362; Belgium 14.
Diatomite and other infusorial earth	6,465	7,544	6,807	Denmark 100.
Feldspar, fluorspar, related materials:				
Unspecified	80	117	--	NA.
Fertilizer materials:				
Crude, n.e.s	963	--		
Manufactured:				
Ammonia	72,191	77,034	39,152	NA.
Nitrogenous	149,875	361,218	77,718	Netherlands 149,545; United Kingdom 49,751; Belgium 48,944.
Phosphatic	9,006	690	497	Israel 177.
Potassic	145,624	197,335	20	Israel 103,474; West Germany 41,928; Canada 37,355.
Unspecified and mixed	34,084	75,968	74,936	Belgium 392; United Kingdom 350; Netherlands 219.
Graphite, natural	1,132	1,261	17	Norway 550; Brazil 53; West Germany 36.
Gypsum and plaster	7,283	8,049	8	West Germany 5,144; United Kingdom 1,545; Spain 1,346.
Halogens:				
Bromine	76	94	--	All from Israel.
Chlorine, value	r$765	$477	--	NA.
Unspecified	9	11	--	Japan 9.
Lime	4,954	7,829	(2)	France 7,514.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Magnesium compounds:				
Magnesite	92,977	92,876	--	Italy 16,550; Republic of Korea 8,239; Greece 6,292.
Magnesia	5,407	1,214	82	United Kingdom 608; West Germany 362.
Mica:				
Crude including splittings and waste	1,187	948	17	United Kingdom 14.
Worked including agglomerated splittings	83	88	24	Belgium 33; United Kingdom 15.
Phosphates, crude	29	20	20	
Pigments, mineral:				
Natural, crude	227	354	--	Austria 264; United Kingdom 35.
Iron oxides and hydroxides, processed	7,891	10,444	7	West Germany 8,255; United Kingdom 1,185; Spain 87.
Potassium salts, crude	98,949	75,548	--	Canada 49,992; West Germany 13,364; Belgium 6,230.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material value, thousands	r$1,196	$1,529	$157	West Germany $237; Switzerland $225; Hong Kong $158.
Meerschaum, amber, jet value	--	$226	--	NA.
Synthetic value, thousands	r$3,729	$4,593	$559	Ireland $1,100; Taiwan $111; Austria $78.
Pyrite, unroasted	10,772	5,090	15	West Germany 34.
Salt and brine	20,502	25,667	69	Australia 23,285; West Germany 866; Israel 851.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxide	r1,759	1,997	--	West Germany 520; Spain 496; France 457.
Sodium carbonate, natural and manufactured	255,439	215,283	127,242	United Kingdom 51,542; Denmark 1,674; West Germany 1,068.
Sodium hydroxide	5,604	12,307	--	Brazil 6,009; West Germany 2,782; United Kingdom 2,412.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,727	1,802	--	Italy 881; Spain 560.
Worked	1,027	1,550	(2)	Italy 1,222; Portugal 207.
Dolomite, chiefly refractory-grade	33	100	--	NA.
Gravel and crushed rock	11,698	2,458	(2)	NA.
Limestone other than dimension	139	72	--	NA.
Quartz and quartzite	405	472	(2)	West Germany 276; Norway 40.
Sand other than metal-bearing	263	151	11	West Germany 89.
Sulfur:				
Elemental:				
Crude including native and byproduct	913,609	764,885	18,658	Canada 745,774; West Germany 342.
Colloidal, precipitated, sublimed	2,431	2,177	2,100	West Germany 40; United Kingdom 36.
Dioxide kilograms	300	200	--	NA.
Sulfuric acid	222,362	158,036	1	West Germany 39,746; Italy 34,889; Japan 22,901.
Talc, steatite, soapstone, pyrophyllite	2,412	2,676	330	Republic of Korea 1,036; Belgium 396; Italy 370.
Other:				
Crude	5,820	8,874	17	Greece 8,393; Australia 138; West Germany 130.
Slag and dross, not metal-bearing	3,662	2,626	331	France 502; United Kingdom 404; Taiwan 287.
Oxides and hydroxides of barium, magnesium, strontium	296	329	52	United Kingdom 102; West Germany 75; Spain 60.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1,756	3,462	560	Austria 1,183; Italy 1,085; United Kingdom 246.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	790	555	416	Belgium 36.
Carbon: Carbon black and gas carbon	4,309	4,354	632	Canada 1,201; France 1,111; West Germany 727.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Bituminous	199,470	51,515	20,463	NA.
Briquets of anthracite and bituminous coal	1	1	--	NA.
Coke and semicoke	21	102	1	United Kingdom 100.
Hydrogen, helium, rare gases	45	26	10	Belgium 14.
Peat including briquets and litter	498	363	--	Finland 150; Canada 84; Ireland 62.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	374	921	64	France 718; Italy 118.
Mineral jelly and wax do	407,985	406,132	66,827	Japan 155,318; West Germany 103,346; Italy 16,121.
Lubricants do	11,080	16,141	5,305	United Kingdom 5,250; West Germany 4,139.
Bitumen and other residues do	1,595	1,422	1,001	West Germany 96.
Bituminous mixtures do	2,595	2,534	1,142	United Kingdom 770; Netherlands 335.
Petroleum coke do	448,181	512,616	423,009	United Kingdom 72,902; Japan 16,500.
Tars and other crude chemicals derived from coal, gas, and petroleum	r193	496	(2)	West Germany 274; United Kingdom 202.

rRevised. NA Not available.

[1]Data presented are imports by the common customs areas of Botswana, Lesotho, the Republic of South Africa, and Swaziland released by the Commissioner for Customs and Excise of the Republic of South Africa.

[2]Unreported quantity valued under $10,000.

[3]Less than 1/2 unit.

[4]Unreported quantity valued at $18,800.

[5]May include platinum-group metals.

[6]Totals exclude unreported quantities valued at $10,924,300 in 1980 and $22,087,500 in 1981.

[7]Unreported quantity valued at $251,250.

Table 4.—Republic of South Africa: Value of domestic sales and exports of major mineral commodities

(Thousand U.S. dollars)

Commodity	Domestic sales			Exports		
	1980	1981	1982	1980	1981	1982
METALS						
Antimony	13,534	10,490	NA	4,119	7,158	NA
Chromite	51,717	38,357	26,209	65,095	60,807	42,466
Copper	193,877	165,705	126,593	191,235	r163,288	148,931
Gold	(1)	(1)	(1)	13,329,098	9,831,548	8,101,564
Iron ore	136,668	r157,149	121,392	243,992	248,538	216,648
Lead concentrate	--	--	--	41,493	r49,146	35,459
Manganese	46,983	55,625	52,471	140,025	134,701	124,442
Nickel	14,949	12,084	8,934	68,981	66,194	36,911
Silver	--	4,080	1,226	65,720	r60,059	46,495
Tin	26,712	r19,089	14,989	22,678	16,042	20,122
Titanium	5,739	5,276	4,493	11,973	13,117	11,966
Uranium	NA	NA	NA	e415,000	e300,000	NA
Vanadium	e50	e50	NA	e80,000	e65,000	NA
Zinc	18,180	r26,963	23,027	3,747	6,973	12,892
NONMETALS						
Andalusite	8,872	11,555	5,887	13,888	7,100	8,466
Asbestos	11,718	r11,489	8,759	119,582	123,330	90,368
Cement	e280,000	e280,000	NA	e35,000	e35,000	e35,000
Clays, flint	4,911	4,902	2,956	5,991	4,684	3,504
Clays, other	10,916	r9,859	6,360	84	77	60
Diamond	(1)	(1)	(1)	710,882	390,562	315,183
Feldspar	3,017	r3,635	3,056	289	279	144
Fluorspar	3,284	3,207	2,762	43,855	r52,007	24,431
Granite	1,850	2,300	1,763	22,201	r21,528	17,023
Gypsum	4,048	5,376	4,944	12	34	33
Lime products	106,112	r95,977	NA	2,697	NA	NA
Limestone	43,531	64,584	2140,041	690	22,917	22,156

See footnotes at end of table.

Table 4.—Republic of South Africa: Value of domestic sales and exports of major mineral commodities —Continued

(Thousand U.S. dollars)

Commodity	Domestic sales			Exports		
	1980	1981	1982	1980	1981	1982
NONMETALS — Continued						
Magnesite	3,204	2,154	2,479	--	28	--
Mica	384	306	298	568	495	356
Phosphate rock	88,760	73,009	63,797	106	764	5,887
Pyrite-sulfur	29,897	r38,993	37,482	2,072	2,523	1,131
Salt	16,123	r17,308	16,964	1,928	r2,445	1,720
Silica, sand	21,362	20,173	15,378	393	r351	283
Sillimanite	826	784	570	2,989	2,251	1,295
Slate	2,003	2,599	1,941	2,918	2,656	2,022
Stone, other	1,227	1,567	1,532	561	539	330
Vermiculite	287	407	346	9,993	14,319	11,662
Wonderstone	243	195	254	654	1,090	467
Miscellaneous	1,927	r243,410	215,158	1,663	r519,654	762,020
MINERAL FUELS						
Anthracite	29,664	31,517	15,500	129,343	r194,312	77,602
Bituminous coal	1,007,560	1,274,886	1,271,586	755,126	r928,430	1,009,154
Total	2,190,135	r2,695,060	2,199,147	16,546,641	r13,329,946	11,168,193

eEstimated. rRevised. NA Not available.
[1]Value, if any, is included under exports.
[2]May include lime products.

Sources: Republic of South Africa Department of Mines, Quarterly Information Circular, Minerals, October-December 1981; Commodity Summaries for Monthly and Annual Periods, 1982; Report of the Department of Mineral and Energy Affairs for the year ended Dec. 31, 1982.

COMMODITY REVIEW

METALS

Antimony.—Consolidated Murchison Ltd. (CML), a subsidiary of Anglovaal Ltd. (AVL), was the world's largest and the country's only antimony producer. AVL's mines in the eastern Transvaal Province produced 405,727 tons of ore from which 78 tons of high-grade (69% antimony) stibnite ore was sorted, and 405,512 tons of ore was milled to produce 15,236 tons of stibnite concentrate containing 55.6% antimony and 14,617 troy ounces of gold. The concentrate and cobbed ore were treated to produce a crude antimony oxide fire retardant in Antimony Products Ltd.'s thermal plant on CML property, jointly owned with other partners including Chemtron Inc. of Chicago. An additional 1,934 troy ounces of gold was recovered from the thermal plant slag. The antimony metal content of the final product was reported as 8,525 tons. CML reported $17.3 million as gross mining income, including $6.2 million for gold sales, against the working cost of $16.4 million for a mining profit of less than $870,000.

Chromite.—The depressed condition of the world's steel industry was reflected in the nation's diminished chromite production, which declined from 2.9 million tons in 1981 to less than 2.2 million tons in 1982. Chromite was produced by Transvaal Mining and Finance Co. Ltd., a subsidiary of General Mining Union Corp. Ltd. (Gencor), from its Montrose, Groothoek, and Tweefontein Mines near Steelpoort, on the eastern limb of the Bushveld Igneous Complex. None of these mines operated at full capacity, as part of cost controlling measures maintained throughout the industry in anticipation of continued low demand for chromite. Several properties owned by Union Carbide Corp. of the United States and by the state were shut down completely, and South African Manganese Amcor Ltd.'s (Samancor) mines in the western part of the Bushveld were put on a care-and-maintenance basis before the yearend.

Copper.—Rio Tinto-Zinc Corp. Ltd.'s Palabora Mining Co. Ltd., in northeastern Transvaal Province, remained one of the most successful among the world copper producers, by actually increasing its pretax profits from $41.4 million in 1981 to $47.7 million, an increase of nearly 44% in terms of local currency. This profit was achieved by cost-cutting operations instituted during past years, such as the trolley-assist installations to provide electric power on the haulage roads out of the pit, and despite the shutdown of the smelter, refinery, and rod casting plant for scheduled maintenance during March. Palabora mined and milled 29.3 million tons of ore containing less than

0.5% copper and produced 331,299 tons of concentrate containing 37% copper. The smelter produced 122,316 tons of anode copper from Palabora concentrate plus 9,982 tons smelted on toll or from purchased material. Refinery production of 126,474 tons of cathode included 10,294 tons toll refined for others and 70,082 tons of refined copper as continuously cast rod. Byproducts included 128,373 tons of sulfuric acid, 91,363 tons of magnetite, 258 tons of U_3O_8 in uranium concentrate, 6,490 tons of ZrO_2 as baddeleyite, 180,992 tons of vermiculite, and 19 tons of precious metal in refinery slimes.

Messina Ltd., formerly The Messina (Transvaal) Development Co. Ltd. operations, near the Zimbabwean border northwest of Palabora, mined and milled 577,000 tons of ore containing 1.32% copper. The concentrate, containing 7,213 tons of copper, was smelted and fire refined to yield 7,001 tons of refined product with an average sales value of $1,500 per ton or about 68 cents per pound. Messina recorded a net loss of about $2.2 million, following a $1.6 million loss at the 1981 average sales price of nearly 75 cents per pound. The company discussed continuation of state financial assistance with officials of the Department of Mineral and Energy Affairs, and planned to discontinue shaft sinking at the Campbell Mine and all mining at the No. 5 and Artonvilla Sections early in 1983.

The Prieska Copper Mines (Pty.) Ltd., owned jointly by AVL and the United States Steel Corp., was continuing to mine about 240,000 tons per month of copper-zinc-pyrite ore from above the 957-meter level. It was estimated that the Prieska ore body would sustain that production rate through 1984 and that mining would cease by yearend 1985.

The O'okiep Copper Co. Ltd. reported ore production for 1982 of 1.67 million tons at an average grade of 1.41% copper derived from its Carolusberg, Hoits, Koperberg, and Spektakel Mines and treated at the Carolusberg and Spektakel concentrators. The Nababeep Mine and mill were idle. The combined concentrator output was 63,000 tons at 32% copper from which the O'okiep smelter recovered 20,746 tons of blister copper. Sales, reported as 20,975 tons at an average price of 74 cents per pound, produced a total revenue of $34.2 million, $4.7 million less than production costs. The vertical crater retreat mining method tested in the Carolusberg "B" ore body has been so successful that the technique was to be extended to the Carolusberg Deep ore body. Development work on this and other ore bodies was continued at a cost of about $17 million, and nearly $1.4 million was expended on exploration of company property, prospecting leases, and optioned prospects in the vicinity. The No. 2 shaft at the Carolusberg Deep ore body was completed at a depth of 1,090 meters and equipping was nearly finished by yearend. Underground development totaled 7,196 meters, and stope drilling was begun. Proven ore reserves were 15.6 million tons of ore containing nearly 2% copper. A new open pit ore body at Schaaprivier yielded 25,000 tons of ore averaging 4.40% copper to the nearby Spektakel concentrator during the year.

The Black Mountain Mineral Development Co. (Pty.) Ltd., jointly owned by Gold Fields of South Africa Ltd. (GFSA) and Phelps Dodge Corp. of the United States, produced and shipped concentrate containing 4,180 tons of copper metal, as well as 118,000 tons of lead and zinc in concentrates. The company declared a profit of nearly $14.6 million.

Gold.—Gold production, at 21,355,111 troy ounces, was slightly higher than in 1981 and, with sales totaling $8.1 billion, the average price realized was $380 per troy ounce. Most of the gold was produced from 33 major mines, of which 32 were managed and partly owned by 1 of 6 multinational mining houses responsible for a large proportion of the mineral production in southern Africa. They were Anglo American Corp. of South Africa Ltd. (AAC), AVL, Barlow Rand Ltd. (BRL), Gencor, GFSA, and Johannesburg Consolidated Investment Co. Ltd. (JCI). Each of the country's major mines produced ingots of gold bullion containing about 88% gold, 10% silver, and 2% base metal impurities, reportedly including some mercury. The ingots were delivered to Rand Refinery Ltd. at Germiston, to be assayed and purchased on behalf of the Reserve Bank of South Africa. The Reserve Bank supplied more than 100 tons of gold to the South African Mint at Pretoria to be minted into coins and sold by International Gold Corp. on behalf of the Chamber of Mines of South Africa. During 1982, the Pretoria Mint reported striking of 2,685,466 of the 1-ounce Krugerrand coins, 429,390 of the 1/2-ounce coins, 1,269,168 of the 1/4-ounce coins, and 1,064,809 of the 1/10-ounce coins, as well as 11,270 each of the 1-rand and 2-rand denominations. The total weight of gold coins minted was 3,328,888 troy ounces.

The average production cost per ton of ore mined and milled decreased slightly to $43.60 equivalent to $193.80 per troy ounce

Table 5.—Republic of South Africa: Gold production and ore reserves, by producer

Producer	Production (troy ounces)			Developed ore	
	1980	1981	1982	Thousand tons	Troy ounces per ton
AAC's Joint Metallurgical Scheme	73,824	112,405	114,981	NA	--
Barberton	49,998	38,098	38,160	NA	--
Blyvooruitzicht	580,302	604,254	643,372	4,910	0.663
Bracken	112,849	112,064	106,544	1,600	.187
Buffelsfontein	854,554	904,506	883,827	10,081	.330
Deelkraal	101,731	171,530	217,574	1,129	.226
Doornfontein	391,972	382,256	348,440	4,296	.336
Driefontein Consolidated:					
East Driefontein	1,263,556	1,168,557	1,134,433	12,396	.486
West Driefontein	1,407,952	1,275,333	1,333,809	7,615	.593
Durban Deep	233,984	265,173	269,195	5,038	.162
East Rand Gold and Uranium Co. Ltd. (Ergo)	220,908	202,453	187,567	NA	NA
East Rand Proprietary Mine	378,491	373,984	343,814	6,609	.230
Elandsrand	168,804	167,322	261,652	1,376	.284
Free State Geduld	1,035,964	883,833	816,671	7,430	.444
Free State Saaiplaas	154,053	(1)	(1)	(1)	(1)
Grootvlei	204,337	210,372	229,367	5,730	.134
Harmony	1,004,646	1,027,087	1,021,333	23,343	.215
Hartebeestfontein	1,032,679	981,661	959,876	14,649	.383
Kinross	293,205	310,399	322,141	7,000	.255
Kloof	972,390	957,034	893,742	3,681	.621
Leslie	118,035	128,429	125,729	2,000	.177
Libanon	347,161	325,597	343,129	7,299	.283
Loraine	171,743	211,445	260,749	7,258	.243
Marievale	43,989	39,124	35,848	380	.143
President Brand	955,469	859,379	807,418	7,872	.395
President Steyn	837,758	787,747	801,611	14,604	.321
Randfontein	669,272	761,297	869,838	6,806	.335
St. Helena	533,988	500,555	469,828	11,500	.276
St. Helena-Beisa	--	--	20,708	600	.078
Stilfontein	559,034	478,766	401,100	5,552	.305
Unisel	184,240	235,681	277,782	3,800	.244
Vaal Reefs	2,246,565	2,363,314	2,531,865	30,101	.373
Venterspost	190,554	181,291	208,353	6,406	.191
Welkom	365,004	(1)	(1)	(1)	(1)
Western Areas	628,676	569,261	544,087	5,802	.236
Western Deep Levels	1,466,743	1,254,293	1,269,179	5,806	.581
Western Holdings	918,074	1,339,969	1,290,955	16,026	.322
West Rand Consolidated	86,402	90,957	122,478	6,479	.190
Winkelhaak	456,949	447,933	422,313	11,700	.215
Witwatersrand Nigel	33,112	36,156	30,498	919	.159
Other	320,501	361,622	395,145	NA	NA
Total or average	21,669,468	21,121,137	21,355,111	267,793	.320

NA Not available.
[1]Free State Saaiplaas and Welkom production and reserves included with Western Holdings after merger during 1981.

Sources: Chamber of Mines of South Africa. Quarterly Analysis of Working Results, October-December 1979-81. U.S. Consulate General. Johannesburg, Republic of South Africa. State Department Airgram A-47, July 15, 1980, pp. 45-48. Supplement to the Mining Journal, London, Jan. 29, 1982, p. 15.

of gold recovered. Working revenue averaged $380.20, leaving an average profit of $186.40 per troy ounce. The declining price of gold in the world's markets was offset by the declining value of the South African rand, while operating costs increased by only 13% compared with the 10% increase reported between 1980 and 1981. In 1982, several groups of mines had initiated expansion prospects when the price of gold was substantially higher than $380. Capital spending has slowed or been deferred so it could be offset against higher future profits when a higher gold price or lower production costs allowed greater tax benefits. As an example, AAC's expansion of its Erfdeel and Dankbaarheid properties with its Welkom, Free State Saaiplaas, and Western Holdings Mines in the Orange Free State was highly sensitive to minimized cash flow and maximized tax writeoffs. As a result, the start of the Erfdeel main shaft was delayed for most of the year but commenced near yearend when a rising gold price appeared certain. However, work continued on Erfdeel's No. 1 ventilation shaft, commenced in December 1981. The hoisting capacity at Saaiplaas warranted an increase of 30,000 tons per month in the milling capacity of its gold plant. Earnings from the Western Deep Levels Mine were adversely affected by a drop in ore grade and by refrigeration problems. Production at GFSA's Kloof Mine was disrupted by one surface and two underground fires, and by underground rock bursts.

New carbon-in-pulp gold recovery plants with capacities of 165,000 tons per month

each were being installed at Gencor's Grootvlei and Kinross operations. The equipment was scheduled to increase throughput by 20% at Grootvlei and 25% at Kinross, and to be operational early in 1983.

Iron Ore and Concentrate.—In 1982, Iscor's Sishen iron mine in northern Cape Province produced 19.53 million tons of beneficiated hematite ore, and its Thabazimbi Mine in western Transvaal Province produced 2.23 million tons of iron ore. AAC's Highveld Steel and Vanadium Corp. Ltd. produced about one-half of the country's reported 4.32 million tons of magnetite ore in the form of vanadiferous and titaniferous magnetite from its Mapoch Mine in the Bushveld Igneous Complex. Both the volume and the value of iron ore exports declined in the last half of the year reflecting the continued depression of the world's steel industry.

Iron, Steel, and Ferroalloys.—About one-half of the production from Iscor's Sishen Mine and virtually all of its Thabazimbi Mine output was consumed in Iscor's major iron and steel fabricating plants at Pretoria and Vanderbijlpark in Transvaal Province and at Newcastle in western Natal Province. Crude ore consumption and fabricated steel production were curtailed during the last half of 1982. The country's total production of steel billets and blooms declined to 7 million tons, 7% below 1981 output. Profile products had a gross weight of 2.6 million tons, 12% below that of 1981. Production of both flat products, at 2.5 million tons, and steel pipe, at 518,000 tons, declined 4% below 1981 production. Output of galvanized sheet increased by 15% to 584,000 tons. The degassing plant at Iscor's Pretoria steelworks was the source of much of the country's 265,000 tons of railroad rails and fasteners.

The new Middelburg plant of BRL's Southern Cross Steel Co. (Pty.) Ltd. had the annual capacity to produce 100,000 tons of hot band and slab steel, 25,000 tons of hot-rolled sheet and 42,000 tons of plate, including 20,000 tons of its new low-cost, corrosion-resistant alloy, 3CR12, of which 8,000 tons was sold in 1982. Southern Cross's immediate parent Middelburg Steel & Alloys Holdings (Pty.) Ltd. (MSA), formerly Middelburg Steel & Alloys (Pty.) Ltd., 74% owned by BRL, was the country's sole producer of stainless steel coil, sheet, and strip. MSA operated one of the world's two completely integrated ferrochromium facilities, supplying about one-half of the world's requirement of that alloy and was capable of supplying the complete range of austenitic and ferritic alloys. It planned to expend about $26 million to convert one of the submerged-arc furnaces at its Krugersdorp plant to a 20-megavolt-ampere, direct-current, arc furnace. The converted furnace was to use a new thermal plasma technique to produce ferrochromium from domestic chromite and coke at a rate of 25,000 (increasing to 50,000) tons per year. The new technique was to utilize both coarse and fine chromite and coke and was expected to have a lower cost per ton of product than orthodox methods of ferrochromium production. MSA reported a turnover of $124 million and an aftertax profit of $2.6 million, an increase of 85% over that for 1981 and extraordinary for a ferrous metal company in 1982. The Palmiet Chrome Corp. (Pty.) Ltd. was amalgamated into MSA during the year.

Lead, Silver, and Zinc.—The Black Mountain Mineral Development Co. (Pty). Ltd. was the country's only major producer of lead and silver from its mining complex near Aggeneys in northwestern Cape Province. Depressed lead and silver prices and increased costs of sales and finance charges caused a drop of 50% in Black Mountain's profits to $14.6 million. The mine's complex ores yielded 98,195 tons of lead in argentiferous lead concentrate, which, along with argentiferous copper concentrate, was railed to Saldanha Bay for export. Zinc concentrate containing 19,883 tons of zinc, as well as some silver, was railed to GFSA's Zinc Corp. of South Africa Ltd.'s (Zincor) refinery at Springs east of Johannesburg. The silver content of all three Black Mountain concentrates was nearly 4.5 million troy ounces. About 2.1 million troy ounces of silver was also recovered by Rand Refinery as a byproduct of gold refining, and some 320,000 troy ounces of silver was recovered as a byproduct of copper refining. About 70,000 tons of zinc metal in concentrate was recovered at the Prieska copper-zinc-pyrite mine at Copperton, 65 kilometers southwest of Prieska in north-central Cape Province. The concentrate was shipped to Zincor's plant for refining. Prieska's zinc sales were up substantially, but despite higher prices for both copper and zinc, the increased cost of sales caused an 80% drop in the company's 1982 profits to about $1.5 million.

Manganese.—Despite fears that the manganese industry would undergo the general depression of the ferrous metal industries,

the Republic of South Africa's production of manganese ore increased nearly 4% to 5.2 million tons, the export sales value increased 15% to nearly $125 million, and domestic sales increased by 17% to more than $52 million. The demand for manganese ore, however, was still short of that anticipated by the country's major producers, whose increased production capacity and efficiency have resulted in some stockpiling. AAC sold its Middelplaats underground manganese mine to Samancor for 9 million Samancor shares, increasing AAC's interest to 30%. Samancor provided new equipment for its Wessels underground mine, and Associated Manganese Mines of South Africa Ltd. has also completed a major program to improve efficiency and control costs.

Nickel and Platinum-Group Metals.—The Republic of South Africa produced 61% of the world's platinum and a substantial proportion of the other platinum-group metals from a number of mines operated by three companies along the Merensky Reef of the Bushveld Igneous Complex. The largest, Rustenburg Platinum Mines Ltd., with its associated Matthey Rustenburg Refiners (Pty.) Ltd. plant at Wadesville and a new base metal refinery operated by its associate, Matthey Nickel Ltd., operated four mines on the Merensky Reef and had a capacity for producing 1.3 million troy ounces of platinum-group metals and 18,000 tons of byproduct nickel. Portions of Rustenburg's mines were in the Bophuthatswana Homeland. All Rustenburg properties were owned by Rustenburg Platinum Holdings Ltd., which was managed and 32.9% owned by JCI. AAC held 23.8%, and GFSA about 2%. The market prices for both platinum-group metals and its byproducts remained low. Platinum reached a low of $250 per troy ounce in June and rose to $316 per troy ounce by the end of August. Worldwide demand from the automotive industries continued to decline, and at yearend, Rustenburg's aftertax profit was $38 million, about 34% of that reported in 1981. The Paardekraal and Turffontein mine shafts were closed in 1982, and the labor force was reduced by not replacing employees who resigned or whose contracts expired.

The country's second largest platinum producer, Impala Platinum Mines (Pty.) Ltd., managed and 44% owned by Gencor, operated mines, concentrators, and smelters with a capacity of about 1 million troy ounces of platinum-group metals per year. These operations were mostly within the Bophuthatswana Homeland, but the refinery was at Springs in Transvaal Province.

Western Platinum Ltd. operated its expanded concentrator on stockpiled Merensky Reef ore and was stockpiling chromite-platinum ore from its new mine on the UG2 reef. The UG2 ore was to be milled when the Merensky ore stockpile was depleted early in 1983.

Tin.—Gross revenue from tin mining was up because of higher tin prices in 1982, but net profits showed a slight decrease because of increased sales costs and taxes. Ore throughput at GFSA's Rooiberg Tin Ltd. plant was up, and production of tin metal increased 17% to 2,471 tons. After tax profits were down marginally at nearly $8 million. Both ore grade and volume decreased at GFSA's Union Tin Mines Ltd. to cause a 15% drop in tin-in-concentrate output to 389 tons, and a 35% drop in aftertax profits to less than $750,000. Rooiberg has continued its exploration drilling program and has maintained adequate ore reserves, but Union Tin has again resorted to retreatment of old tailings to augment production. Zaaiplaats Mining Co. Ltd., controlled by a subsidiary of AAC, has completed rehabilitation of its mining and concentrating plant and equipment, but was unable to maintain smelter throughput during the year.

Titanium, Vanadium, and Zirconium.—Quebec Iron and Titanium Ltd. was the parent company of Tisand (Pty.) Ltd. and Richards Bay Iron and Titanium Ltd. (RBIT). Tisand operated a dredge and recovered ilmenite, rutile, zircon, and monazite concentrates from dune sands along the coast north of Richards Bay. RBIT operated an electric furnace to produce 381,000 tons of titanium slag and 200,000 tons of low-manganese pig iron, mostly for the export market. Purified rutile, zircon, and monazite concentrates were also produced for the export market. Additional zirconium was exported in the form of baddeleyite concentrate produced by Palabora and Foskor as byproducts of their copper and phosphate mining operations on the Palabora carbonatite.

Highveld, managed and 50% owned by AAC's subsidiary, Anglo American Investment Corp. Ltd., operated the Mapoch Mine, operating on the world's largest deposit of vanadiferous, titaniferous magnetite ore in the Bushveld Igneous Complex. According to Highveld's annual report for the year, the estimated vanadium pentoxide

production from the Republic of South Africa was 20,400 tons, equivalent to 53% of total world production, and 78% of the country's rated capacity. Despite closures of vanadium pentoxide facilities in the United States, Australia, and Norway, and restricted production from other plants, worldwide consumption declined, and by yearend, the price of vanadium pentoxide was one-half that of yearend 1981. As a result, Highveld continued to operate only portions of its plant and Rand Carbide converted its furnace to the production of ferrosilicon at a cost of $6.5 million. The new furnace was commissioned in September.

NONMETALS

Andalusite and Related Minerals.—Output of andalusite and sillimanite decreased by 14% and 35%, respectively. Andalusite export volume increased 28% to nearly 77,000 tons and the value rose 48% to $8.5 million. Sillimanite export volume and value declined about 30%. Lack of water for washing these minerals clean of residual clay was undoubtedly a factor for the diminished production of both minerals. Andalusite occurs in the metamorphosed contact zone around the Bushveld Igneous Complex, and the lower grade ores, less than 54% Al_2O_3, were produced in the Zeerust area from two mines owned by Cullinan Minerals (Pty.) Ltd. of Lydenburg, central Transvaal. The main producing area for better grade mineral, more than 58% Al_2O_3, was near Lydenburg, where production was from another Cullinan Mine at Krugerspost, BRL's Annesley Mine, and the Havercroft Mine, owned by AAC's Vereeniging Refractories Ltd. Weedons's Minerals Pty. Ltd. operated the Timeball Andalusite Mine near Thabazimbi. Sillimanite production was from mines operated by Pella Refractory Ores S.A. (Pty.) Ltd. and by R.G. Niemoller (Pty.) Ltd. near Pofadder in northwest Cape Province.

Asbestos.—Virtually all crocidolite and amosite asbestos mining was controlled by the Gencor affiliate, Griqualand Exploration and Finance Co. Ltd., and the major chrysotile asbestos producer, Msauli, near the Swaziland border, was administered and 40% owned by Gencor. Despite ongoing mining problems at Msauli, production of crysotile asbestos increased nearly 6% over 1981 output, while production of the chemically resistant amosite asbestos, from the Egnep Mine near Penge, 170 kilometers to the northwest of Swaziland, was 24% lower than in 1981. Production of the longer, stronger, more flexible fibers of Cape blue crocidolite asbestos, from the arid northern part of Cape Province, was 15% lower than in 1981. Crocidolite had been reported to be more carcinogenic than the other asbestos mineral species, but reports of evidence to the contrary were the basis for a 1981 ruling by a committee of the European Economic Community permitting the use of crocidolite for valve packing, in gaskets, and for large-diameter cement asbestos pipe.[3]

Cement, Lime, and Limestone.—Production of limestone and dolomite was 22.4 million tons. Domestic sales of 17.5 million tons had a value of $140 million. A large proportion was used in the production of 8.1 million tons of cement worth about $535 million, slightly less than was made in 1981. Pretoria Portland Cement Ltd. (PPC), owned 62% by BRL, the largest producer, operated factories at Johannesburg, Pretoria, Orkeny, and near Mafeking in Transvaal Province, and Port Elizabeth, De Hoek, and Riebeeck West in Cape Province. Its associate, Northern Lime Ltd., operated one of the world's largest limestone quarry complexes at Lime Acres, north of Kimberley. PPC also operated quarries and a lime plant at Marble Hall, northeast of Pretoria in Transvaal Province.

Anglo-Alpha Ltd., an associate of AVL, operated three cement factories, one each at Roodepoort near Johannesburg, near Lichtenburg in western Transvaal Province, and at Ulco, 80 kilometers north of Kimberley in Cape Province. The British-based Blue Circle Cement Co. Ltd. operated limestone quarries and a cement factory at Lichtenburg and another at Hennenman in Orange Free State Province. Union Lime Co. Ltd. operated quarries and lime kilns at Danielskuil near Postmasburg in Cape Province. Iscor, Samancor, and other companies operated limestone or dolomite quarries for flux in industrial areas of Transvaal Province and elsewhere.

A new 500,000-ton-per-year cement-clinker factory was started at Simuna in the Port Shepstone vicinity, 100 kilometers southwest of Durban by Natal Portland Cement Ltd. as a joint effort of PPC, AVL, and Blue Circle. The cost included $106 million financed by Standard Bank, $12 million as an export credit facility from a French bank, and $29 million from the Government-backed IDC. The three cement companies also jointly operated a factory at

Durban that blended ground cement with ground slag from Iscor's furnaces, and marketed the product under the trade name "Slagment." Anglo-Alpha expanded Umzimkulu lime quarry to include $12.2 million worth of secondary crushing and milling machinery and flotation and scrubbing plants, and to provide finer, whiter calcium carbonate for new industrial applications.

Diamond.—In terms of domestic currency, there was a 5% increase in the volume and 9% in the value of the country's diamond sales in 1982, but in terms of U.S. dollars, the sales value of rough gem and industrial diamonds by De Beers Central Selling Organization decreased 15% to $1.26 billion. Demand for smaller, lower priced gem diamonds remained strong throughout the year and was showing signs of increasing for the larger, better quality, rough stones by yearend. A market research estimate of consumption of new diamond jewelry indicated the volume was comparable with the record breaking 32 million pieces of 1981, and that their sales value of $18 billion was slightly lower than in 1981.

De Beers mines produced 8,754,393 carats or nearly 94% of the country's total output of 9,153,990 carats, and its largest producer in the Republic of South Africa was the Finsch Mine, 150 kilometers northwest of Kimberley in Cape Province. Most of the 4,253,600 tons of Finsch ore came from the 172- to 232-meter levels of the open pit and contained 90.52 carats of diamond per 100 tons to yield 3,850,463 carats. Overburden was stripped above the 112- to 160-meter levels. The main shaft was completed and equipped for underground operation by April, and the west ventilation shaft was completed by mid-September. Underground development, including the ground handling system, was completed and operational in early December. A crosscut from the spiral ramp to the main shaft on the 350-meter level was completed in November, and development of the spiral ramp continued. By yearend, the ventilation crosscuts were completed on the 290-meter level, the east ventilation shaft was at a depth of 120 meters, the shaft offices and change houses were occupied, and additional houses, hostels, and a canteen were completed. At the Koffiefontein Mine, in northwestern Orange Free State Province, 951,500 tons of ore at a grade of 11.42 carats per 100 tons was treated to recover 108,693 carats of diamonds. Mining was stopped in June, and by September, the mining equipment and treatment plant had been mothballed and the mine placed on a care-and-maintenance basis. Many of Koffiefontein's 1,200 employees were transferred to the Finsch operation or to other De Beers or AAC group mines.

Of the Kimberley area mines, 662,800 tons of ore at a grade of 21.26 carats per 100 tons was obtained from the old De Beers Mine yielding 140,942 carats of diamonds. Nearly one-half the ore came from the 620-meter sublevel cave, and the remainder from the 745-meter block cave except for nearly 30,000 tons drawn from the 620-meter-level east cave remnant. The Dutoitspan Mine treated 585,800 tons of 17.15-carat-per-100-ton ore from the 760-meter-level block cave to recover 100,407 carats of diamonds. Drainage holes were drilled from surface and from the underground water diversion tunnels, and the joint ventilation shaft was commissioned in August. At the Bultfontein Mine, ore production was 671,300 tons at a grade of 41.42 carats per 100 tons, and diamond production was 278,056 carats. Ore came from the 580-meter-level block cave and rim-loading sections, and from the 700-meter-level block cave. A rim-loading section was developed east of the 580-meter-level for production in 1983. Drainage holes were drilled from the water tunnels surrounding the pipe early in 1982, and a winze was driven from the 580- to the 640-meter-level in an attempt to divert water from entering the southeast section of the 700-meter block cave.

The Wesselton Mine plant treated 1,383,900 tons of 22.66-carat-per-100-ton ore to produce 313,564 carats of diamonds. More than 50% of the ore came from the 785-meter-level block cave, and the remainder was from remnant blocks on the 635-, 660-, and 713-meter levels. Exploratory drilling and development work have disclosed that substantially more ore can be recovered from remnants than was originally estimated, and an additional ore pass was developed and commissioned during the year to handle the increased production. Bultfontein produced 370,996 carats of diamonds from 1,115,800 tons of ore at a grade of 33.25 carats per 100 tons. Evaluation of sampling results at the Kamfersdam kimberlite indicated that the property was not viable and no further work was contemplated. The only work done at the Kimberley Mine was routine maintenance of the drainage tunnel and measurements to detect movement of the walls of the "Big Hole."

At the Premier Mine northeast of Pretoria, 5,381,000 tons of ore from underground yielded 1,854,137 carats at a grade of 34.46 carats per 100 tons, and 1,197,000 tons of "dump" material yielded 605,859 carats at a grade of 50.61 carats per 100 tons. This allowed an increase of nearly 21% in diamond production from 4% less ore. Improvements made to the crushing circuits contributed to the recovery of larger quantities of fine diamonds and to the overall improvement in apparent ore grades. Capital expenditure on development of access to kimberlite ore below the dolerite sill was suspended at midyear but was to be resumed early in 1983.

Production of beach terrace alluvial diamonds from the Namaqualand Mines was curtailed in 1982. The Annex Kleinzee, Dreyers Pan, and Tweepad plants treated 2,596,000 tons of ore at a grade of 10.88 carats per 100 tons to recover 282,427 carats of diamond, less than 50% of the 1981 output. At the Koingnass Complex, 220,600 tons of gravels from Mitchells Bay and 1,342,000 tons of Koingnass ore yielded 624,365 carats of diamonds, an increase of 14% above 1981 output. The Langhoogte Mine treated 303,000 tons of ore at a grade of 14.66 carats per 100 tons and recovered 44,424 carats of diamonds. The dragline excavator was commissioned in April. It removed 13.6 million tons of overburden and was mothballed along with the other equipment at yearend when Annex Kleinzee operations were suspended.

The Department of Mineral and Energy Affairs managed the State Alluvial Diamond Diggings at Alexander Bay at the mouth of the Orange River, which removed 3,381,940 cubic meters of overburden and produced 137,488 carats of diamond in 1982, an increase of nearly 10% over 1981 output. The average size of diamond sold was 0.35 carat, the same as in 1981, but only 9% of the total weight was in stones larger than 1 carat each, as opposed to 32.5% in 1981. The largest diamond recovered weighed 50 carats, and the total weight of all stones larger than 9.8 carats was 1,201.5 carats, a little more than one-half of the 1981 output. Three boats and three tractor-mounted, land-based pump units were used to recover 671.5 cubic meters of gravel containing more than 13,000 carats of diamonds from the seabed. Prospecting and development drilling continued to explore Orange River terrace deposits and beach terraces in the Port Nolloth Reserve and in the Rietfontein area.

Table 6.—Republic of South Africa: Marketed diamond output, by Province

Province	1980		1981		1982	
	Output (carats)	Price per carat	Output (carats)	Price per carat	Output (carats)	Price per carat
Mine diamond:						
Transvaal	2,342,714	$39.92	1,871,107	$28.08	2,251,168	$18.54
Cape Province	3,902,256	52.04	4,693,074	27.12	4,746,484	21.61
Orange Free State	531,708	167.92	353,082	98.07	211,760	95.11
Total or average	6,776,678	56.94	6,917,263	31.00	7,209,412	22.81
Alluvial diamond:						
Transvaal	26,882	506.93	23,902	282.00	26,689	184.81
Cape Province	1,645,920	189.12	1,171,100	144.59	1,224,818	112.65
Orange Free State	764	115.13	127	544.64	321	372.87
Total or average	1,673,566	194.19	1,195,129	147.38	1,251,828	114.25
Grand total or average[1]	8,450,245	84.13	8,112,392	48.14	8,461,151	36.35

[1]Data may not add to totals shown because of independent rounding.

Sources: Republic of South Africa Department of Mineral and Energy Affairs, Quarterly Information Circular, Minerals, October-December 1981, p. 3, and Monthly Commodity Summaries for 1982. R1=US$1.149 for 1981, and R1=US$0.9228 for 1982.

Fluorspar.—Production of acid-grade fluorspar declined 35% below 1981 output, and metallurgical-grade output was down 30%, while ceramic-grade production increased to nearly 10,000 tons, almost 60% more than the 1981 output. Despite an overall production decline of 33%, the Republic of South Africa remained the second largest of the Western World's fluorspar producers, after Mexico. Most of the country's metallurgical-grade fluorspar was used by Iscor as a flux in steel production, and the ceramic-grade material was used as a flux and a component of glazes and enamels

in the country's glass and ceramics industries. A large proportion of chemical-grade fluorspar was exported to the United States, Japan, and the Federal Republic of Germany to be used in the production of hydrofluoric acid and fluorocarbons. Gencor's Buffalo Mine, in the central part of the Bushveld Igneous Complex, continued to be the country's largest mine with a capacity of 240,000 tons per year. The 67% BRL affiliate Transvaal Consolidated Land and Exploration Co. Ltd. operated the 180,000-ton-per-year Marico Fluorspar (Pty.) Ltd. Mine near Zeerust and the 115,000-ton-per-year Vergenoeg Mining Co. (Pty.) Ltd. operation east of Pretoria was affiliated with Bayer A.G. of the Federal Republic of Germany. The U.S. Phelps Dodge operated the 90,000-ton-per-year Rheunosterfontein fluorspar mine near Zeerust, and Armco Bronne, one of the U.S. steel producers, again contemplated a new operation southeast of Zeerust.

Phosphate Rock.—IDC's Foskor Mine and mill, at the Palabora carbonatite deposit, produced 2.8 million tons of apatite concentrate from its own ore and from tailings pumped from the nearby Palabora copper concentrator. The concentrate contained in excess of 30% P_2O_5, and nearly 2.7 million tons was sold locally to Federale Kunsmis Ltd., Triomf Fertilizer (Pty.) Ltd., and other companies that manufactured phosphoric acid and a wide range of fertilizers. About 125,000 tons of concentrate and larger amounts of phosphoric acid and fertilizers were exported, but most of the production was marketed locally. Glenover Phosphate Ltd., 50% owned by GFSA, produced igneous apatite concentrate from a carbonatite north of Thabazimbi. Samancor operated the Langebaan sedimentary phosphate deposit near Saldanha Bay and produced a raw-rock fertilizer sold as "Langfos" in Cape Province. Samancor also used igneous apatite at its Chemfos Ltd. and Polyfos (Pty.) Ltd. plants, at Meyerton, near Johannesburg, to make Calmafos fertilizer, sodium tripolyphosphate, as well as yellow phosphorus and phosphoric acid for the chemical industry.

MINERAL FUELS

Coal.—The country's coal industry continued to set new records in both production sales and value in terms of local currency. Total coal output of more than 140 million tons was 7.5% higher than in 1981. Total sales of nearly 134 million tons were 4.7% above those in 1981, but export sales at 27.5 million tons were lower by 8% than those of 1981. The Richards Bay coal terminal handled 26.1 million tons of the total exported. The total sales value was an increase of 22% over the 1981 figure in terms of local currency but declined by 2.3% to $2.37 billion in terms of U.S. dollars. Coal-fired steam generating plants supplied nearly 95% of the country's electrical power and consumed more than 60% of the 103 million tons of coal sold domestically. The Government-operated Electricity Supply Commission (Escom) burned 55.2 million tons of coal in its own power stations to meet a demand for 15,532 megawatts from an installed power capacity of 21,749 megawatts. It sent out nearly 103 billion kilowatt-hours of electricity and sold 93 billion kilowatt-hours at a rate slightly under 3 cents (U.S.) per kilowatt-hour. Nearly 28 billion kilowatt-hours was sold to the mining industry, of which 75% was consumed by gold and uranium mining. The engineering, iron, steel, and base metal industries used about 15 billion kilowatt-hours. Coal mining consumed less than 2 billion kilowatt-hours, but many coal mines operated their own powerplants, some fueled with waste or middlings from their coal beneficiating plants. Escom expended $550 million to purchase coal and for its rail transport.

More than $2.4 billion was being spent for capital developments to expand existing mines and to start new collieries. AAC was commissioning one new colliery at Goedehoop for production in early 1983. Its New Denmark colliery was scheduled to commence coal production for Escom's Tutuka power station near Standerton in 1983 and was to achieve full production before commissioning of the first generating unit in 1985. Similarly, its New Vaal open pit mine was scheduled to commence a planned four-dragline operation by 1985, before the neighboring Lethabo power station is completed. BRL was developing a new colliery at its Khutala property and, jointly with British Pretroleum of South Africa Ltd., a property at Middelburg. These five new mines were to have a joint capacity of 43 million tons per year. Planned expansion of existing mines, including Escom's Matla, BRL's Duvha, AAC's Kleinkopje, and Sasol's Secunda, was scheduled to increase their joint output to 68 million tons per year.

In 1982, the Republic of South Africa was

shipping increasing quantities of steam coal to Hong Kong's massive powerplant on Lamma Island, which was scheduled to be supplied with coal from China by 1985. Shipments of more than 2 million tons of steam coal to Japan reportedly accounted for 20% of that country's requirements for thermal coal.

Petroleum.—The state-owned Southern Oil Exploration Corp. (Pty.) Ltd. expended $59 million to continue drilling offshore of Mossel Bay in the western part of the country's south coast. The results of testing three of the nine completed holes were as follows: Hole E-G1, 137 kilometers southwest of Mossel Bay, had an estimated flow rate of 3.8 to 5.7 barrels of oil per day with minor amounts of gas. Hole E-G2, 136 kilometers southwest of Mossel Bay, tested over a combined thickness of 85 meters of sandstone, produced 90,600 cubic meters of gas and 900 barrels of oil per day, at a ratio of 633 to 1. The oil was classed as light, volatile, with API gravity of 52.2°. This was the first offshore drill hole to produce oil at surface during a test. In hole F-AR1, 84 kilometers south of Mossel Bay, tests of more than 61.4 meters of permeable sandstone produced 552,179 cubic meters of gas and 748 barrels of natural gas liquid per day. Hole E-G3 intersected oil and gas in sandstone more than 37 meters thick. Testing was scheduled for 1983.

The Sasol III plant commenced production in 1982 as scheduled, but plans for the construction of a coal gasifier jointly with Westinghouse Electric Corp. of the United States were canceled.

Uranium.—Uranium oxide concentrate production declined 5% below that of 1981 to 6,863 tons, as depressed market conditions caused some operations to curtail or cease production. However, the new uranium recovery plant at AAC's Western Areas and Gencor's Beisa Mines offset most of the cutbacks. Another new uranium recovery plant at AAC's Afrikander Lease operation was completed, but was immediately placed on a care-and-maintenance basis, and its sales commitments taken over by Vaal Reefs.

[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from South African rand (R) to U.S. dollars at the rates of R1=US$1.1490 for 1981 and R1=US$0.9228 for 1982.

[3]Robinson, I. Industrial Minerals. Article in Coal, gold and base minerals, Johannesburg, v. 31, No. 5, May 1983, p. 51.

Table 7.—Republic of South Africa: Production of U_3O_8, by producer

(Kilograms)

Producer	1979	1980	1981	1982
AAC's Joint Metallurgical Scheme[1]	676,262	977,116	1,093,416	863,361
Blyvooruitzicht	285,710	324,482	315,502	252,270
Buffelsfontein	620,400	603,800	631,750	580,500
East Rand Gold and Uranium Co. Ltd. (Ergo)	238,734	295,314	302,194	264,814
Harmony	540,925	490,822	580,428	591,090
Hartebeestfontein	394,210	435,242	478,663	429,103
Palabora Copper	121,252	140,000	234,206	257,879
Randfontein	412,959	646,452	591,774	462,837
St. Helena-Beisa	--	--	--	253,612
Vaal Reefs	1,273,415	1,758,386	1,693,569	1,721,782
West Driefontein	288,274	251,656	242,327	224,601
West Rand Consolidated	367,512	385,924	190,258	--
Western Areas	--	--	--	170,638
Western Deep Levels	199,002	212,562	212,484	183,394
Miscellaneous	218,345	773,619	667,856	606,670
Total	5,637,000	7,295,375	7,234,427	6,862,551

[1]Includes recovery of U_3O_8 from concentrates and tailings produced by the Free State Geduld, Free State Saaiplaas, President Brand, President Steyn, Welkom, and Western Holdings Mines, all subsidiaries of Anglo-American Corp. in the Orange Free State Province.

Sources: Chamber of Mines of South Africa. Quarterly Analysis of Working Results, October-December 1979-82. Republic of South Africa, Department of Mineral and Energy Affairs, Quarterly Statistical and Other Data on Minerals, October-December 1979-81. Department of Mineral and Energy Affairs, Annual Report 1982. Palabora Mining Co. Ltd., Annual Reports 1979-82. East Rand Gold and Uranium Co. Ltd., Annual and Quarterly Reports, 1979-82.

The Mineral Industry of Spain

By Roman V. Sondermayer[1]

In 1982, by European standards, Spain was an important producer of mercury, pyrite, fluorspar, strontium, gypsum, magnesite, potash, feldspar, and lead. In addition, Spain continued to make efforts to stimulate domestic production of minerals, with an aim to lower imports of raw materials and to cut the trade deficit, which was largely caused by imports of liquid gaseous hydrocarbons. The overall economic situation in the country was affected by the slow world economy, which slowed exports. Unemployment was near 15% and inflation was close to 14%. Including processing and refining, the mineral industry of Spain (gross value of product) contributed about 12% to the gross national product; the extractive segment was only about 1%. The industry employed close to 600,000 persons of which mining provided employment for one-third.

The major events of the mineral industry included development of a new mine at Sotiel, exploration for lead in the Province of León, beginning of mercury production at El Entredicho (a new mine near Almadén), and discovery of a phosphate deposit in the Province of Ciudad Real.

Table 1.—Spain: Principal mineral industry companies and locations, by commodity

Commodity	Major companies	Location of principal facilities
Alumina	Alúmina de España S.A	Plant at San Ciprián.
Aluminum	Alúminio Español S.A	Do.
Do	Endasa S.A	Plant at Avilés and Valladolid.
Do	Alúminio de Galicia S.A	Plant at La Coruña and Sabiñánigo.
Bituminous coal	Hunosa S.A	Mines in Astúrias.
Cement	Asland S.A	7 plants at various locations.
Copper ore	Río Tinto Minero S.A	Mines at Río Tinto.
Copper, refined	do	Refinery at Huelva.
Ferroalloys	Soc. Española de Carburos Metálicos S.A.	Plant at Berga.
	Hidro Nitro Españolas S.A	Plant at Monzón.
	Ferroaleaciones Españolas S.A	Plant at Medina del Campo.
Iron ore	Cía. Andalusa de Minas S.A	Mine at Marquesado.
Lead ores	Sociedad Minera y Metallúrgica de Peñarroya de España.	Mines at Mantas de los Azules, Unión.
Lead smelter	do	Smelter at Santa Lucía.
Mercury	Consejo de Administracion de Minas de Almadén.	Mines and smelter at Almadén.
Petroleum, refined	Empresa Nacional del Petróleo S.A	Refineries at Valle de Escombreras, Puertollano, Tarragona.
Do	Cía. Esp. de Petróleos S.A	Refineries at St. Cruz de Tenerife, Algeciras.
Potash	Potasas de Navarra S.A	Mine near Pamplona.
Do	Minas de Potasas de Suria S.A	Mine near Suria.
Do	Unión Explosivos Río Tinto S.A	Mines at Balsarney-Sallent and Cardona.
Pyrite	Tharsis Sulfur and Copper Co. Ltd	Mines at Tharsis and La Zarza.
Steel	Empresa Nacional Siderúrgica S.A	Works at Avilés, Felguera, Gijón-Moreda, Gijón-Verina.
Do	Altos Hornos de Vizcaya S.A	Work at Baracaldo-Sestao.
Zinc ore	Real Cía. Asturiana de Minas S.A	Mines at Reocín and Rubiales.
Zinc, smelter	do	Electrolytic zinc plant at San Juan de Nieva.

PRODUCTION

The mineral industry of Spain is owned by the Government and by private entities. The Government manages most of its companies through the Instituto Nacional de Industria (INI).

Table 2.—Spain: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite	9,274	16,845	7,899	8,930	10,000
Alumina	--	--	58,000	695,000	[2]672,000
Metal:					
Primary	212,100	259,511	386,492	396,600	[2]366,500
Secondary	39,100	42,000	43,000	40,000	35,000
Antimony, mine output, metal content	442	501	625	646	[2]459
Arsenic, white[e]	10	--	--	--	--
Cadmium metal	253	222	309	[2]303	300
Copper:					
Mine output, metal content	33,948	[r 2]31,324	42,483	[2]50,923	[2]40,904
Metal:					
Blister:					
Primary	95,500	90,300	85,100	[2]87,900	88,000
Secondary	17,000	18,000	18,000	20,000	20,000
Total	112,500	108,300	103,100	[2]107,900	108,000
Refined:					
Primary	[r]122,000	[r 2]126,100	[2]138,700	[2]137,100	[2]156,623
Secondary	[r]25,000	[r]18,600	[2]15,600	[2]15,000	16,000
Total	147,000	[r]144,700	154,300	[e]152,100	172,623
Gold, mine output, metal content—troy ounces	102,882	91,404	108,154	[e]105,000	100,000
Iron and steel:					
Iron ore and concentrate (including byproduct concentrate):					
Gross weight—thousand tons	8,580	8,827	9,227	8,565	[2]8,370
Iron content—do	3,906	3,994	4,372	4,218	[2]4,130
Metal:					
Pig iron—do	6,243	6,454	6,720	6,423	[2]5,991
Electric-furnace ferroalloys—do	[r]380	[r 2]421	[2]383	[2]293	290
Steel:					
Crude—do	11,044	12,058	12,333	12,662	[2]13,160
Castings and forgings—do	225	246	253	250	NA
Total—do	11,269	12,304	12,586	[2]12,912	[2]13,160
Semimanufactures—do	10,801	9,202	9,472	NA	NA
Lead:					
Mine output, metal content	71,341	72,262	87,105	80,200	80,000
Metal:					
Primary	83,400	87,200	84,300	77,000	80,000
Secondary	38,800	39,800	39,700	37,800	37,000
Mercury:					
Mine output, metal content					
76-pound flasks	29,588	33,275	49,198	45,253	45,000
Metal	31,037	32,375	43,038	49,000	49,000
Silver, mine output, metal content, thousand troy ounces	[r 2]2,373	[r 2]2,294	4,526	5,347	5,500
Tantalum minerals (tin byproduct):					
Gross weight—kilograms	44,650	34,400	50,700	58,399	58,000
Tantalum content—do	10,316	8,452	[2]12,768	15,133	11,000
Tin:					
Mine output, metal content	711	496	437	563	550
Metal, primary	4,575	4,412	4,100	3,400	3,000
Titanium dioxide	39,336	[e]40,000	[e]40,000	40,000	40,000
Tungsten, mine output, metal content	358	394	446	437	440
Uranium, mine output, U_3O_8 content	284	349	394	273	280
Zinc:					
Mine output, metal content	146,844	142,745	183,120	182,045	[2]167,000
Metal, primary and secondary	177,000	182,700	151,800	179,500	[2]187,000
NONMETALS					
Barite	71,457	74,700	59,827	52,695	50,000
Bromine[e]	400	400	400	400	350
Cement, hydraulic, other than natural, thousand tons	30,233	27,912	[2]28,010	28,751	29,000

See footnotes at end of table.

Table 2.—Spain: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Clays:					
Attapulgite	39,230	62,423	48,020	NA	NA
Bentonite	108,318	120,678	97,705	117,727	120,000
Kaolin, marketable:					
Crude	57,961	72,425	46,066	71,665	72,000
Washed	193,136	204,106	181,116	189,990	190,000
Refractory, not further described	294,799	427,817	[2]416,114	527,851	528,000
Other thousand cubic meters	8,984	8,590	7,838	NA	NA
Diatomite and tripoli	21,370	27,196	23,460	[e]23,500	20,000
Feldspar	116,283	115,685	103,365	105,000	100,000
Fluorspar:					
Gross weight:					
Acid-grade	201,505	155,278	204,596	275,500	214,000
Metallurgical-grade	99,790	37,620	40,153	40,200	47,000
Total	301,295	192,898	244,749	315,700	261,000
CaF_2 content:					
Acid-grade	195,994	150,327	198,152	259,500	[2]197,595
Metallurgical-grade	76,893	28,600	29,631	31,500	[2]43,548
Total	272,887	178,927	227,783	291,000	[2]241,143
Gypsum and anhydrite, crude thousand tons	5,369	5,275	5,223	5,200	5,300
Kyanite, andalusite, related materials	5,087	5,355	6,471	[e]6,500	6,000
Lime, hydrated and quicklime[e] thousand tons	[r 2]432	[r 2]701	[2]950	1,051	1,100
Magnesite:					
Calcined	128,627	147,761	153,933	150,000	[2]137,500
Crude	306,548	381,867	505,532	500,000	450,000
Mica	3,345	5,169	4,831	3,524	3,300
Nitrogen: N content of ammonia thousand tons	[r 2]1,073	[r]1,006	902	[e]900	750
Pigments, mineral:					
Ocher	12,227	15,078	13,696	14,000	13,000
Red iron oxide[2]	24,000	25,000	25,000	25,000	23,000
Potash salts, K_2O equivalent	612,581	667,560	658,230	705,000	750
Pumice	902,402	779,118	1,086,417	937,851	900,000
Pyrites including cuprous, gross weight thousand tons	2,292	2,366	2,394	2,400	2,200
Salt:					
Rock including byproduct from potash works do	2,092	2,187	2,379	2,300	2,300
Marine and other do	1,277	[r]1,261	1,129	1,411	1,400
Sand and gravel: Silica sand do	[3]2,438	[3]2,178	2,425	1,832	1,800
Sepiolite	131,817	202,810	286,232	320,554	--
Sodium compounds:					
Sodium carbonate, manufactured thousand tons	499	[e]500	[e]505	[e]500	500
Sodium sulfate:					
Natural:					
Glauberite, Na_2SO_4 content	104,492	101,780	37,735	55,374	50,000
Thenardite, Na_2SO_4 content	102,975	106,022	118,324	209,333	200,000
Manufactured	121,704	175,000	[e]175,000	175,000	170,000
Stone:[2 4]					
Calcareous:					
Chalk thousand tons	276	282	278	160	NA
Dolomite do	1,948	1,909	2,043	1,990	NA
Limestone do	89,958	85,379	81,239	78,673	NA
Marble do	722	823	753	694	NA
Marl do	6,557	7,708	7,150	6,210	NA
Basalt do	1,391	1,434	920	1,138	NA
Granite do	6,693	6,794	7,224	7,514	NA
Ofite do	1,066	1,169	458	659	NA
Phonolite do	329	466	396	568	NA
Porphyry do	490	462	396	341	NA
Quartz do	717	790	708	636	NA
Quartzite do	426	448	401	347	NA
Sandstone do	1,749	1,265	1,633	1,759	NA
Serpentine do	306	409	302	342	NA
Other do	29,308	29,855	29,890	26,819	NA
Strontium minerals:					
Gross weight	14,000	18,000	19,000	36,000	35,000
Sr_2O_4 content	12,320	16,560	17,480	33,120	30,000
Sulfur:					
S content of pyrites thousand tons	1,046	1,091	1,096	1,118	1,100
Byproduct:					
Of metallurgy do	117	120	125	135	130
Of petroleum do	10	10	12	12	10
Of coal (lignite) gasification do	3	3	3	3	3
Total do	1,176	1,224	1,236	1,268	1,243
Talc and steatite	61,892	71,047	73,949	69,068	70,000

See footnotes at end of table.

Table 2.—Spain: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural	13,100	8,710	NA	NA	NA
Carbon black	[e]53,000	53,000	54,000	NA	NA
Coal (marketable):					
Anthracite thousand tons	3,831	3,796	4,077	4,863	[2]5,195
Bituminous do.	7,668	8,049	9,070	9,080	[2]10,338
Lignite do.	8,272	10,696	15,390	20,986	[2]23,494
Total do.	19,771	22,541	28,537	34,929	[2]39,027
Coke, metallurgical do.	3,886	3,897	4,000	NA	NA
Fuel briquets:					
Briquets do.	7	6	NA	NA	NA
Ovoids do.	43	40	40	NA	NA
Gas, natural, marketed million cubic feet	531	363	300	NA	NA
Peat	31,519	46,379	44,367	NA	NA
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	7,134	8,383	11,732	11,969	NA
Refinery products:					
Gasoline, motor do.	46,719	46,844	45,452	NA	NA
Jet fuel do.	19,055	17,928	17,091	NA	NA
Kerosine do.	893	473	1,061	NA	NA
Distillate fuel oil do.	78,136	83,272	80,219	NA	NA
Residual fuel oil do.	138,875	139,663	151,365	NA	NA
Lubricants including grease do.	1,706	1,657	2,386	NA	NA
Other do.	44,289	[e]44,000	47,346	NA	NA
Refinery fuel and losses do.	20,848	[e]21,000	21,700	NA	NA
Total do.	350,521	354,837	366,620	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 18, 1983.
[2]Reported figures.
[3]Includes sand obtained as a byproduct of feldspar and kaolin production.
[4]Units revised.

TRADE

As in the past, Spain's imports of fuels and minerals burdened the country's balance of payments.

Table 3.—Spain: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline and rare-earth metals:				
Lithium: Oxides and hydroxides	16	--		
Alkaline-earth metals	NA	34	--	All to Italy.
Unspecified	57	--		
Aluminum:				
Ore and concentrate	6,173	1,449	--	All to Portugal.
Oxides and hydroxides	82	23,907	--	France 14,899; Netherlands 9,000.
Metal including alloys:				
Scrap	204	101	--	West Germany 42; Portugal 40; Switzerland 19.
Unwrought	106,782	162,682	1,034	Israel 34,554; Netherlands 32,166; Belgium-Luxembourg 29,137.
Semimanufactures	19,495	18,834	1,386	Portugal 2,985; France 2,582; Japan 2,315.
Antimony:				
Oxides	44	24	--	All to Portugal.
Metal including alloys, all forms	370	568	--	Netherlands 353; France 112; Tunisia 48.

See footnotes at end of table.

Table 3.—Spain: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Beryllium: Oxides and hydroxides	NA	144	--	Netherlands 143.
Cadmium: Metal including alloys, all forms	NA	204	90	Netherlands 110; France 4.
Chromium:				
Ore and concentrate	6,267	41	--	Tunisia 31; Portugal 10.
Oxides and hydroxides	533	64,101	--	France 64,012; West Germany 35; Israel 30.
Cobalt:				
Oxides and hydroxides kilograms	1,000	363	--	Belgium-Luxembourg 250; Iran 113.
Metal including alloys, all forms	NA	3	--	All to France.
Columbium and tantalum:				
Ore and concentrate	56	--		
Metal including alloys, all forms, tantalum	5	1	1	
Copper:				
Ore and concentrate	--	33,471	--	U.S.S.R. 12,942; East Germany 9,583; Peru 3,500.
Matte and speiss including cement copper	233	799	--	West Germany 783; Algeria 15.
Oxides and hydroxides	76	10	10	
Sulfate	88	405	59	France 274; Iran 40; Guatemala 15.
Ash and residue containing copper	NA	311	--	West Germany 295; France 16.
Metal including alloys:				
Scrap	884	978	--	United Kingdom 561; Portugal 297; France 101.
Unwrought	66,294	74,391	(1)	France 28,014; Italy 19,703; Belgium-Luxembourg 13,699.
Semimanufactures	22,505	20,160	255	Iran 6,171; Morocco 3,327; Syria 2,424.
Germanium: Metal including alloys, all forms kilograms	NA	46	--	Venezuela 38; Andorra 8.
Gold:				
Waste and sweepings value	$194,848	$51,289	--	Finland $36,189; West Germany $10,117; Switzerland $4,983.
Metal including alloys, unwrought and partly wrought troy ounces	26,717	611,869	289	United Kingdom 289,359; West Germany 128,604; Switzerland 128,604.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	2,088	1,147	--	Netherlands 563; West Germany 153; Romania 131.
Pyrite, roasted	371,653	389,466	--	West Germany 373,215; France 10,725.
Metal:				
Scrap	869	502	--	Belgium-Luxembourg 308; West Germany 94; United Kingdom 34.
Pig iron, cast iron, related materials	47,947	32,249	--	Egypt 9,943; Sweden 7,196; Italy 6,106.
Ferroalloys:				
Ferrochromium	NA	8,927	--	France 3,092; United Kingdom 2,300; West Germany 1,101.
Ferromanganese	31,344	32,031	11,509	Italy 7,330; Romania 5,998; West Germany 4,148.
Ferromolybdenum	NA	291	--	Netherlands 179; Sweden 80; West Germany 17.
Ferrosilicomanganese	NA	6,583	--	Japan 1,995; Sweden 1,500; West Germany 1,250.
Ferrosilicon	NA	42,834	--	West Germany 18,491; United Kingdom 6,303; Italy 3,053.
Unspecified	90,069	1,822	90	Belgium-Luxembourg 900; Denmark 335; Italy 282.
Steel, primary forms	544,839	634,380	43,447	Yugoslavia 82,985; Brazil 75,048; Saudi Arabia 44,090.

See footnotes at end of table.

Table 3.—Spain: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections ------ thousand tons	2,799	3,181	248	Algeria 314; Iran 301; Morocco 244.
Universals, plates, sheets	645,371	863,719	188,379	India 91,170; West Germany 63,848; Iran 55,238.
Hoop and strip	29,981	22,085	755	West Germany 4,362; Argentina 4,198; France 3,380.
Rails and accessories	3,760	15,647	--	Venezuela 10,132; Saudi Arabia 4,997; Poland 317.
Wire	42,799	41,722	2,039	Portugal 11,859; France 5,603; Algeria 5,004.
Tube, pipes, fittings	467,226	421,557	143,178	Iran 70,281; Mexico 35,396; France 26,815.
Castings and forgings, rough	11,448	11,219	997	France 2,181; Argentina 1,231; Colombia 1,134.
Lead:				
Ore and concentrate	9,394	32,183	--	Canada 8,947; Romania 8,907; Italy 6,278.
Oxides	1	7	--	Algeria 5.
Ash and residue containing lead	NA	9,420	--	West Germany 7,200; Belgium-Luxembourg 2,162.
Metal including alloys:				
Scrap	240	66	--	All to France.
Unwrought	7,633	23,379	--	Panama 11,200; U.S.S.R. 5,500; Belgium-Luxembourg 4,450.
Semimanufactures	3,286	7,500	108	U.S.S.R. 4,950; Belgium-Luxembourg 1,750; Portugal 404.
Magnesium: Metal including alloys:				
Unwrought ------ kilograms	--	1	--	All to Peru.
Semimanufactures ------ do	NA	5,030	--	United Kingdom 5,000; Venezuela 30.
All forms	2	--		
Manganese:				
Ore and concentrate, metallurgical-grade	68	91	--	Portugal 69; Austria 13; Netherlands 9.
Oxides	3,202	2,538	--	France 1,362; Romania 388; Italy 354.
Metal including alloys, all forms	NA	89	--	Ethiopia 88; Morocco 1.
Mercury ------ 76 pound flasks	19,290	21,518	11,745	France 2,320; Republic of South Africa 1,537; India 1,508.
Metalloids:				
Arsenic:				
Oxides and acids	NA	276	90	Republic of South Africa 140; France 21; Iran 16.
Metal including alloys, all forms	NA	1	--	All to Morocco.
Selenium	5	--		
Silicon	13,667	5,974	200	Japan 3,195; Netherlands 1,562; U.S.S.R. 1,000.
Molybdenum:				
Oxides and hydroxides	NA	1	--	All to Portugal.
Metal including alloys, all forms	10	(1)	--	Mainly to Portugal.
Nickel:				
Ore and concentrate	5	--		
Matte and speiss	--	20	--	Mainly to Portugal.
Oxides and hydroxides	NA	63	--	Netherlands 62.
Ash and residue containing nickel	NA	252	--	Austria 154; West Germany 76.
Metal including alloys:				
Scrap	168	79	--	West Germany 51; United Kingdom 19; France 9.
Unwrought	11	1	--	NA.
Semimanufactures	29	19	8	France 3; Venezuela 3; Austria 1.
Platinum-group metals:				
Metal including alloys, unwrought and partly wrought, unspecified ------ troy ounces	9,999	19,066	8,874	Switzerland 4,308; United Kingdom 2,990; Venezuela 1,929.

See footnotes at end of table.

Table 3.—Spain: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Rhenium: Metal including alloys, all forms kilograms	NA	5	--	All to Hungary.
Silver:				
Ore and concentrate[2] value	$7,000	$171,989	--	All to Finland.
Waste and sweepings[2] do	$425,000	$223,386	--	West Germany $207,387; Japan $14,829.
Metal including alloys, unwrought and partly wrought thousand troy ounces	184,002	9,774	--	United Kingdom 3,312; Switzerland 386; West Germany 354.
Tin:				
Ore and concentrate kilograms	--	48	--	All to Venezuela.
Oxides	72	--		
Ash and residue containing tin	NA	2,695	--	Sweden 2,650; United Kingdom 43.
Metal including alloys:				
Scrap	65	91	--	United Kingdom 69; Netherlands 22.
Unwrought	229	248	--	United Kingdom 203; Netherlands 39.
Semimanufactures	259	17	--	Algeria 5; Cuba 5; Iran 3.
Titanium:				
Ore and concentrate	--	25	20	Portugal 5.
Oxides	11,494	22,001	4,619	France 3,843; United Kingdom 2,752; West Germany 2,256.
Metal including alloys, all forms	NA	11	--	United Kingdom 7; Sweden 3.
Tungsten:				
Ore and concentrate	4,216	621	33	West Germany 249; Netherlands 228; United Kingdom 67.
Metal including alloys, all forms	49	23	--	United Kingdom 9; West Germany 7; Switzerland 7.
Uranium and/or thorium: Ore and concentrate	37	--		
Vanadium: Oxides and hydroxides	NA	1	--	All to Portugal.
Zinc:				
Ore and concentrate	54,796	44,376	--	Belgium-Luxembourg 15,532; France 8,831; Italy 8,376.
Oxides	838	1,442	--	Italy 670; Belgium-Luxembourg 504; France 180.
Blue powder	128	893	850	France 43.
Matte	NA	582	--	West Germany 307; Republic of South Africa 255.
Ash and residue containing zinc	NA	2,975	--	Belgium-Luxembourg 1,580; Republic of South Africa 987; West Germany 363.
Metal including alloys:				
Unwrought	93,831	88,203	29,608	Netherlands 15,747; India 15,027; U.S.S.R. 6,498.
Semimanufactures	74	404	--	West Germany 135; France 123; Equatorial Guinea 88.
Zirconium:				
Ore and concentrate	97	75	--	Portugal 57; Italy 18.
Metal including alloys, all forms kilograms	NA	346	--	All to United Kingdom.
Other:				
Ores and concentrates	14	78	23	Netherlands 36; Portugal 18.
Oxides and hydroxides	1,513	3,296	1	West Germany 1,502; Algeria 1,200; France 125.
Ashes and residues	28,068	11,307	22	Sweden 8,666; Belgium-Luxembourg 2,305; United Kingdom 172.
Pyrophoric alloys	32	9	--	Mainly to Portugal.
Cermets	NA	37	--	All to United Kingdom.
Base metals including alloys, all forms	59	--		

See footnotes at end of table.

Table 3.—Spain: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s..				
Natural: Corundum, emery, pumice, etc	1,666	1,582	--	West Germany 747; Portugal 230; France 184.
Artificial:				
Corundum	3,598	4,025	--	West Germany 2,086; Italy 1,328; Belgium-Luxembourg 132.
Silicon carbide	NA	2,415	--	France 985; Libya 500; Japan 414.
Dust and powder of precious and semi-precious stones, including diamond value	$98,000	$162,381	--	Ireland $121,371; Mexico $29,539; Syria $5,806.
Grinding and polishing wheels and stones	3,029	3,838	132	West Germany 1,313; Hungary 387; France 256.
Asbestos, crude	17	12	--	Mexico 9; Cuba 1; Greece 1.
Barite and witherite	52,018	65,827	54	West Germany 28,589; Ivory Coast 11,704; Egypt 8,350.
Boron materials:				
Crude natural borates	69	519	--	Morocco 500; Portugal 16.
Oxides and acids	412	1,232	--	Bulgaria 1,110; Algeria 50; Egypt 50.
Cement thousand tons	10,057	9,226	213	Saudi Arabia 3,059; Nigeria 1,299; Egypt 1,261.
Chalk	32,178	25,709	--	Algeria 12,244; Libya 5,650; Portugal 4,850.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	NA	122	--	Netherlands 100; West Germany 22.
Bentonite	32,581	29,689	--	Portugal 18,817; France 3,416; Gabon 2,001.
Chamotte earth	NA	3,916	--	Italy 2,500; Ireland 1,100; Republic of South Africa 316.
Kaolin	79,407	51,809	8	West Germany 17,885; Ireland 6,534; Italy 5,971.
Unspecified	40,097	38,227	--	Netherlands 15,310; United Kingdom 4,098; Egypt 3,035.
Products:				
Nonrefractory	548,932	670,429	27,779	France 148,496; Saudi Arabia 87,990; West Germany 65,116.
Refractory including nonclay brick	29,993	17,665	(1)	Egypt 8,189; Cuba 3,289; France 1,088.
Cryolite and chiolite	--	16	--	All to United Kingdom.
Diamond:				
Gem, not set or strung value, thousands	$1,049	$433	$2	Belgium-Luxembourg $401; Mexico $30.
Industrial do	$250	$400	--	Belgium-Luxembourg $252; Mexico $108; United Kingdom $16.
Diatomite and other infusorial earth	1,673	2,505	--	France 874; United Kingdom 581; Italy 400.
Feldspar, fluorspar, related materials:				
Feldspar	1,582	1,833	--	United Kingdom 1,017; France 635; Cuba 156.
Fluorspar	107,518	152,826	25,209	U.S.S.R. 37,869; Italy 23,226; West Germany 18,636.
Fertilizer materials:				
Crude, n.e.s	8,110	5,266	--	West Germany 3,990; France 1,201.
Manufactured:				
Ammonia	15	24	--	Guinea-Bissau 12; Mauritania 8.
Nitrogenous	65,250	86,492	2,271	West Germany 53,692; Indonesia 10,970; France 9,399.
Phosphatic	7,473	33	--	All to Andorra.
Potassic	574,354	607,518	28,757	Portugal 62,090; Norway 57,040; United Kingdom 48,625.
Unspecified and mixed	254,163	140,467	--	Iran 29,195; Turkey 23,800; Venezuela 19,000.

See footnotes at end of table.

Table 3.—Spain: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Graphite, natural	8	197	--	France 178; Sweden 14.
Gypsum and plaster thousand tons	1,120	1,083	206	Denmark 204; Sweden 178; Finland 110.
Halogens:				
Chlorine	NA	21,177	--	France 10,567; United Kingdom 8,640; Portugal 1,959.
Iodine	1	--		
Lime	3,889	5,497	--	France 2,217; Equatorial Guinea 1,015; Portugal 751.
Magnesium compounds:				
Magnesite	NA	45,899	--	West Germany 15,017; United Kingdom 10,159; France 6,570.
Oxides and hydroxides	NA	4,923	--	United Kingdom 1,884; Sweden 1,300; Ireland 600.
Other	91,165	47,026	--	United Kingdom 11,331; France 9,809; West Germany 9,176.
Mica:				
Crude including splittings and waste	6,059	2,683	--	United Kingdom 2,645; Italy 26; Tunisia 10.
Worked including agglomerated splittings	224	202	--	West Germany 72; Italy 53; Turkey 25.
Nitrates, crude	34	100	--	Oman 60; United Arab Emirates 40.
Phosphates, crude	17	--		
Pigments, mineral:				
Natural, crude	NA	306	19	France 193; Venezuela 25; Portugal 24.
Iron oxides and hydroxides, processed	12,044	10,731	651	United Kingdom 1,002; France 835; Venezuela 809.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$557	$324	--	Belgium-Luxembourg $141; Switzerland $110; United Kingdom $32.
Gem material do	$556	$558	$7	Switzerland $455; Italy $42; Ireland $15.
Pyrite, unroasted	234,887	378,678	--	Belgium-Luxembourg 263,553; Greece 77,148; Italy 28,358.
Salt and brine	479,733	336,257	53,070	Iceland 57,510; Norway 50,687; Canada 43,331.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	3,876	2,583	120	Republic of South Africa 512; France 289; Brazil 258.
Sodium carbonate, natural and manufactured	71,999	33,097	--	Argentina 23,800; Algeria 8,371; Sweden 860.
Sodium hydroxide	92,459	50,797	--	Portugal 17,778; U.S.S.R. 9,040; Iran 8,180.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	206,761	188,792	196	Italy 144,337; France 14,879; Japan 10,279.
Worked	192,194	200,901	1,731	France 140,867; West Germany 26,597; Saudi Arabia 11,051.
Dolomite, chiefly refractory-grade	75,885	88,810	--	United Kingdom 68,095; West Germany 12,200; Peru 3,625.
Gravel and crushed rock	35,658	45,452	--	Morocco 34,485; Andorra 10,718; Ivory Coast 111.
Limestone other than dimension	5,694	3,300	--	All to Guinea.
Quartz and quartzite	357,702	327,977	--	Norway 254,751; France 40,940; Sweden 28,559.
Sand other than metal-bearing	351,491	285,327	--	Andorra 263,824; Greece 15,210; Portugal 5,999.
Sulfur:				
Elemental:				
Crude including native and byproduct	6,264	2,145	--	France 2,140.
Colloidal, precipitated, sublimed	6,993	10,487	--	Algeria 10,486.
Dioxide	NA	119	--	All to Portugal.
Sulfuric acid	17,417	51,032	--	Republic of South Africa 21,676; Turkey 11,898; Algeria 10,734.

See footnotes at end of table.

Table 3.—Spain: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Talc, steatite, soapstone, pyrophyllite	11,357	7,440	60	United Kingdom 2,343; France 1,838; West Germany 1,475.
Vermiculite	NA	386	--	Italy 316; Brazil 50.
Other:				
Crude	563,549	538,960	1,500	Belgium-Luxembourg 207,999; France 94,681; West Germany 90,620.
Slag and dross, not metal-bearing	77,450	112,099	--	France 63,162; Portugal 45,683.
Oxides and hydroxides of barium, magnesium, strontium	49	257	--	Libya 170; Republic of South Africa 60; Portugal 7.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	41,766	48,467	240	France 14,641; Egypt 13,584; Nigeria 8,807.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1	12,342	--	Niger 4,951; Nigeria 2,682; Mauritania 1,600.
Carbon: Carbon black	16,221	12,797	--	Portugal 7,146; Morocco 2,309; France 1,265.
Coal:				
Anthracite and bituminous	17,196	14,062	--	Belgium-Luxembourg 10,482; Portugal 3,417; Andorra 155.
Briquets of anthracite and bituminous coal	--	11	--	Egypt 10.
Lignite including briquets	28	--		
Coke and semicoke	3,124	23	--	All to France.
Gas, natural cubic feet	r742	35	--	All to Mauritania.
Hydrogen, helium, rare gases	1,329	2,656	--	Libya 1,965; France 562; Portugal 78.
Peat including briquets and litter	16	101	--	Lebanon 80; Portugal 18.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	1,057	530	--	Libya 344; Morocco 186.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	r849	11,435	--	Ivory Coast 8,730; Cape Verde 2,698.
Gasoline do	r625,269	810,178	31,297	Netherlands 387,124; Egypt 84,703; Andorra 62,254.
Mineral jelly and wax do	19,706	13,765	1,409	Colombia 1,968; Nigeria 1,582; Morocco 1,362.
Kerosine and jet fuel do	r981,305	772,032	28,660	India 237,018; United Kingdom 235,809; Egypt 124,256.
Distillate fuel oil thousand 42-gallon barrels	4,707	2,879	73	Iran 375; India 300; bunkers 1,249.
Lubricants do	r1,665	2,242	99	Italy 705; France 592; Mexico 192.
Residual fuel oil do	6,686	13,879	291	Netherlands 2,752; Italy 2,613; Sweden 1,477; bunkers 5,417.
Bitumen and other residues do	r3,501	3,425	--	Libya 1,738; Nigeria 450; Algeria 389.
Bituminous mixtures do	666	767	--	Nigeria 322; Libya 238; Algeria 58.
Petroleum coke do	2,855	8	--	Mainly to Portugal.
Tars and other crude chemicals derived from coal, gas, and petroleum	207,479	210,668	--	Netherlands 87,752; France 56,928; Portugal 38,494.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.

Table 4.—Spain: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium:				
Oxides and hydroxides	127	120	39	U.S.S.R. 73; China 3; Italy 2.
Metal including alloys, all forms kilograms	NA	38	31	West Germany 7.
Alkaline metals	328	145	--	West Germany 128; France 15.
Alkaline-earth metals kilograms	NA	4,128	--	Canada 4,125.
Rare-earth metals	46	6	--	West Germany 4; Austria 2.
Unspecified	--	8	(1)	Austria 4; West Germany 4.
Aluminum:				
Ore and concentrate	349,384	825,546	--	Guinea 722,116; Guyana 48,310; Suriname 24,145.
Oxides and hydroxides	706,581	228,727	20,132	Guinea 77,914; Jamaica 54,449; France 46,615.
Ash and residue containing aluminum	NA	7,519	1,407	Cameroon 1,910; Austria 1,880; Venezuela 810.
Metal including alloys:				
Scrap	5,631	5,778	487	Portugal 2,732; France 974; Morocco 597.
Unwrought	3,164	13,642	(1)	Iceland 4,746; France 2,696; Canada 2,046.
Semimanufactures	16,769	14,067	1,997	West Germany 3,979; France 2,925; Italy 1,238.
Antimony:				
Ore and concentrate	657	480	--	Morocco 153; Burma 121; Bolivia 100.
Oxides	210	194	--	France 95; United Kingdom 57; West Germany 24.
Metal including alloys, all forms	35	47	--	Hong Kong 28; France 9; Japan 6.
Beryllium:				
Oxides and hydroxides	NA	213	--	Israel 200; United Kingdom 13.
Metal including alloys, all forms kilograms	12	5	--	All from West Germany.
Bismuth: Metal including alloys, all forms	72	73	(1)	West Germany 29; Mexico 25; United Kingdom 17.
Cadmium: Metal including alloys, all forms	10	10	--	Mainly from West Germany.
Chromium:				
Ore and concentrate	84,558	70,330	--	Albania 26,375; Turkey 25,849; Republic of South Africa 15,476.
Oxides and hydroxides	133	271	1	West Germany 184; United Kingdom 51; U.S.S.R. 30.
Metal including alloys, all forms	19	13	(1)	United Kingdom 4; Zaire 4; West Germany 3.
Cobalt: Oxides and hydroxides	72	95	8	Canada 42; France 18; United Kingdom 16.
Columbium and tantalum:				
Ore and concentrate	10	NA		
Metal including alloys, all forms:				
Columbium (niobium)	NA	101	101	
Tantalum	6	2	1	West Germany 1.
Copper:				
Ore and concentrate	204,097	152,754	(1)	Papua New Guinea 70,395; Mexico 50,000; Chile 16,454.
Matte and speiss including cement copper	3,811	8,660	--	Israel 5,231; Italy 1,082; France 703.
Oxides and hydroxides	383	474	(1)	West Germany 194; Norway 149; Italy 96.
Sulfate	499	223	--	France 220.
Ash and residue containing copper	NA	20,863	2,637	Peru 7,733; Norway 4,200; France 1,720.
Metal including alloys:				
Scrap	35,852	32,236	7,104	France 10,459; West Germany 2,456; Algeria 2,203.
Unwrought	49,521	51,984	2,306	Chile 27,623; Belgium-Luxembourg 13,501; Finland 4,120.
Semimanufactures	100,041	48,728	1,686	France 18,536; Netherlands 5,356; United Kingdom 5,040.

See footnotes at end of table.

Table 4.—Spain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Gallium: Metal including alloys, all forms ____ kilograms__	NA	18	__	United Kingdom 10; Japan 7.
Germanium: Metal including alloys, all forms ____	NA	10	9	West Germany 1.
Gold:				
Waste and sweepings ___ value, thousands__	$179,389	NA		
Metal including alloys, unwrought and partly wrought __ thousand troy ounces__	96	31	(1)	West Germany 19; Switzerland 10.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons__	4,757	4,687	__	Brazil 2,108; Venezuela 743; Liberia 653.
Pyrite, roasted ____	26	11,055	__	Mauritania 11,050.
Metal:				
Scrap ____ thousand tons__	3,926	3,896	409	United Kingdom 2,243; France 633; Netherlands 214.
Pig iron, cast iron, related materials ____	173,695	159,847	14	Canada 65,799; West Germany 52,933; France 8,978.
Ferroalloys:				
Ferrochromium ____	NA	21,442	1,765	Republic of South Africa 8,037; Zimbabwe 5,533; Sweden 2,350.
Ferromanganese ____	NA	509	__	Brazil 317; West Germany 105; France 60.
Ferromolybdenum ____	NA	78	5	Belgium-Luxembourg 32; Italy 12; United Kingdom 11.
Ferronickel ____	NA	3,563	__	Dominican Republic 1,194; France 1,146; New Caledonia 675.
Ferrosilicochromium ____	NA	1,271	__	Zimbabwe 650; Republic of South Africa 621.
Ferrosilicomanganese ____	NA	104	__	Republic of South Africa 103.
Ferrosilicon ____	NA	3,259	(1)	France 1,152; Norway 848; West Germany 709.
Unspecified ____	70,031	2,371	431	France 635; West Germany 469; Netherlands 199.
Steel, primary forms ____	591,955	530,858	2,493	West Germany 195,693; France 173,084; Netherlands 52,824.
Semimanufactures:				
Bars, rods, angles, shapes, sections ____	201,786	188,894	1,852	West Germany 52,358; France 38,825; United Kingdom 31,666.
Universals, plates, sheets ____	350,537	295,945	2,706	West Germany 87,019; France 61,690; Netherlands 53,864.
Hoop and strip ____	84,505	62,529	169	West Germany 23,004; France 18,879; Norway 5,365.
Rails and accessories ____	2,358	2,409	34	United Kingdom 1,104; West Germany 657; France 370.
Wire ____	17,044	13,532	70	Belgium-Luxembourg 3,515; West Germany 3,373; France 2,601.
Tubes, pipes, fittings ____	47,329	56,355	3,095	France 18,821; West Germany 15,389; Japan 5,198.
Castings and forgings, rough ____	2,276	2,532	166	Italy 1,278; France 590; Belgium-Luxembourg 178.
Lead:				
Ore and concentrate ____	28,081	28,190	__	Ireland 10,644; Republic of South Africa 8,728; Morocco 4,919.
Oxides ____	88	104	(1)	Bulgaria 100; West Germany 2.
Ash and residue containing lead ____	NA	8,250	44	Belgium-Luxembourg 7,695; United Kingdom 339; West Germany 89.

See footnotes at end of table.

Table 4.—Spain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys:				
Scrap	129	1,920	456	Greece 1,228; France 110; Jordan 43.
Unwrought	4,328	7,174	26	Netherlands 2,954; France 1,907; United Kingdom 1,133.
Semimanufactures	307	155	63	West Germany 79; Italy 7; France 4.
Magnesium: Metal including alloys:				
Scrap	30	17	--	All from Lebanon.
Unwrought	1,315	1,121	847	France 141; Norway 128.
Semimanufactures	39	54	24	West Germany 16; France 7; Canada 2.
Manganese:				
Ore and concentrate, metallurgical-grade	432,648	253,991	61	Republic of South Africa 88,313; Ghana 77,152; Australia 33,285.
Oxides	637	554	51	Ireland 280; Belgium-Luxembourg 210.
Metal including alloys, all forms	1,565	1,342	1	Portugal 1,258; Republic of South Africa 61; France 20.
Mercury 76-pound flasks	26	18	1	West Germany 9; Austria 7.
Metalloids:				
Arsenic:				
Oxides and acids	NA	241	--	Belgium-Luxembourg 147; France 94.
Metal including alloys, all forms	18	35	--	Sweden 32; China 3.
Boron including alloys, all forms value	NA	$4,625	$1,441	Sweden $3,055.
Phosphorus	NA	320	8	Republic of South Africa 159; West Germany 85; Netherlands 55.
Selenium	32	35	--	Canada 21; United Kingdom 6; Japan 4.
Silicon	148	341	(1)	France 332; Belgium-Luxembourg 9.
Tellurium kilograms	1,000	1,646	485	United Kingdom 1,000; Canada 150.
Molybdenum:				
Ore and concentrate	NA	1,817	477	United Kingdom 908; Chile 155; West Germany 126.
Oxides and hydroxides	43	42	--	West Germany 24; United Kingdom 18.
Metal including alloys:				
Unwrought	NA	3	2	NA.
Semimanufactures	NA	1,038	8	Netherlands 1,022; West Germany 4; Austria 3.
All forms	34	--		
Nickel:				
Matte and speiss	1,779	2,244	22	Cuba 859; Canada 436; Australia 374.
Oxides and hydroxides	NA	51	--	Canada 34; France 17.
Ash and residue containing nickel	NA	622	20	West Germany 322; United Kingdom 194; Denmark 45.
Metal including alloys:				
Scrap	7	2	--	All from United Kingdom.
Unwrought	6,281	3,670	828	Canada 1,248; United Kingdom 409; Republic of South Africa 241.
Semimanufactures	780	1,332	17	Netherlands 929; West Germany 126; United Kingdom 98.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified thousand troy ounces	6,109	257	3	Republic of South Africa 224.
Rhenium: Metal including alloys, all forms kilograms	NA	398	--	Netherlands 391.
Silver:				
Ore and concentrate[2] value, thousands	$17,156	$7,804	$325	Republic of South Africa $2,424; Morocco $1,870; Peru $1,395.
Waste and sweepings[2] do	$86,522	$31,517	$3,714	France $16,181; Switzerland $4,616; United Kingdom $4,468.
Metal including alloys, unwrought and partly wrought thousand troy ounces	20,673	2,347	1,093	West Germany 507; France 228; Italy 45.

See footnotes at end of table.

Table 4.—Spain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	4,363	4,071	--	United Kingdom 1,893; Thailand 1,037; Indonesia 614.
Oxides	342	265	--	United Kingdom 146; Italy 71; West Germany 48.
Ash and residue containing tin	NA	1,899	1,172	Belgium-Luxembourg 303; West Germany 160; United Kingdom 142.
Metal including alloys:				
Unwrought	NA	38	(1)	Zimbabwe 20; United Kingdom 14; West Germany 3.
Semimanufactures	NA	58	1	United Kingdom 20; France 18; Italy 11.
All forms	127	--		
Titanium:				
Ore and concentrate	134,920	146,798	--	Australia 76,375; Norway 69,923.
Oxides	2,227	2,919	138	Belgium-Luxembourg 780; France 614; West Germany 611.
Metal including alloys, all forms	NA	280	213	Italy 21; West Germany 20; Netherlands 12.
Tungsten:				
Oxides and hydroxides kilograms	NA	175	--	All from West Germany.
Metal including alloys:				
Unwrought	NA	203	(1)	Netherlands 201; France 1.
Semimanufactures	NA	496	1	Netherlands 477; France 7; West Germany 5.
All forms	18	--		
Uranium and/or thorium:				
Ore and concentrate value, thousands	--	$14,856	--	Guinea $11,413; Mexico $3,079; United Kingdom $356.
Metal including alloys, all forms kilograms	165	717	210	West Germany 507.
Vanadium:				
Oxides and hydroxides	282	85	(1)	Finland 70; West Germany 11; China 3.
Ash and residue containing vanadium	NA	237	--	Finland 210; Republic of South Africa 27.
Zinc:				
Ore and concentrate	40,192	54,276	--	Peru 31,799; Ireland 22,477.
Oxides	577	522	(1)	West Germany 321; United Kingdom 48; Italy 42.
Blue powder	NA	27	--	Belgium-Luxembourg 26.
Matte	NA	3,989	197	West Germany 845; Netherlands 559; Morocco 228.
Ash and residue containing zinc	NA	542	--	Israel 219; Morocco 128; Republic of South Africa 54.
Metal including alloys:				
Scrap	60	408	--	France 401.
Unwrought	1,684	753	--	West Germany 254; Belgium-Luxembourg 252; Netherlands 246.
Semimanufactures	209	368	5	Belgium-Luxembourg 199; Netherlands 54; United Kingdom 34.
All forms	--	--		
Zirconium:				
Ore and concentrate	45,230	37,585	(1)	Australia 24,508; Republic of South Africa 12,977; United Kingdom 68.
Metal including alloys, all forms kilograms	1,000	1,042	729	United Kingdom 118; Belgium-Luxembourg 100; West Germany 51.
Other:				
Ores and concentrates	6,413	1,375	--	Republic of South Africa 1,069; Australia 306.
Oxides and hydroxides	1,089	644	(1)	France 389; West Germany 187; United Kingdom 14.
Ashes and residues	51,384	247	39	Malaysia 100; United Kingdom 41; Italy 40.
Pyrophoric alloys	26	25	(1)	France 19; Austria 3; United Kingdom 1.
Cermets kilograms	NA	787	20	Japan 461; United Kingdom 234; Argentina 60.
Base metals including alloys, all forms	13,055	--		

See footnotes at end of table.

Table 4.—Spain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	337	1,203	22	Greece 1,000; Italy 97; West Germany 49.
Artificial:				
Corundum	2,967	4,198	70	West Germany 1,589; France 1,271; Austria 583.
Silicon carbide	NA	1,016	(1)	West Germany 479; Norway 380; France 133.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$3,764	$3,606	$2,085	Ireland $1,407; Ghana $48; United Kingdom $43.
Grinding and polishing wheels and stones	1,605	1,493	58	Italy 427; France 310; West Germany 265.
Asbestos, crude	67,148	59,938	844	Zimbabwe 18,977; Canada 18,497; Republic of South Africa 9,286.
Barite and witherite	849	567	--	France 530; Netherlands 22.
Boron materials:				
Crude natural borates	87,209	86,423	35,897	Turkey 49,138; France 1,388.
Oxides and acids	84	198	--	France 176; Italy 12; United Kingdom 9.
Cement	191,849	50,799	143	Poland 30,867; Italy 7,639; Morocco 4,539.
Chalk	10,503	6,783	60	France 6,699; Belgium-Luxembourg 16.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	NA	2,039	416	Morocco 399; United Kingdom 369; Republic of South Africa 233.
Bentonite	31,664	27,977	6,190	Morocco 13,676; Greece 6,198; France 1,397.
Chamotte earth	NA	4,986	22	France 4,688; Portugal 260.
Dinas earth	NA	875	756	France 117.
Kaolin	167,278	166,786	6,283	United Kingdom 123,795; France 13,254; West Germany 9,994.
Unspecified	80,002	56,867	2,714	United Kingdom 40,694; France 5,749; Morocco 4,882.
Products:				
Nonrefractory	64,494	36,575	1	Italy 22,480; Portugal 7,090; West Germany 2,818.
Refractory including nonclay brick	36,847	36,322	1,354	West Germany 10,357; Italy 7,015; Austria 5,843.
Cryolite and chiolite	4,577	1,115	--	Denmark 1,103.
Diamond:				
Gem not set or strung value, thousands	$22,843	$18,916	$30	Belgium-Luxembourg $13,017; Israel $2,947; India $1,287.
Industrial do	$942	$705	--	Republic of South Africa $527; Belgium-Luxembourg $130; Netherlands $25.
Diatomite and other infusorial earth	3,094	2,938	1,434	France 1,181; Belgium-Luxembourg 137; West Germany 108.
Feldspar, fluorspar, related materials:				
Feldspar	21,408	15,668	6	France 14,609; Republic of South Africa 432; Norway 231.
Fluorspar	62	1,452	--	France 1,444; West Germany 8.
Unspecified	NA	3,937	--	Norway 3,238; Canada 676.
Fertilizer materials:				
Crude, n.e.s	1,980	2,828	--	France 1,793; Netherlands 1,031.
Manufactured:				
Ammonia	480,452	444,255	--	U.S.S.R. 185,529; Mexico 113,332; United Kingdom 71,078.
Nitrogenous	181,692	139,465	201	Netherlands 45,903; West Germany 34,065; Norway 26,835.
Phosphatic	24,606	14,358	(1)	France 5,965; Belgium-Luxembourg 5,796; Portugal 2,080.

See footnotes at end of table.

Table 4.—Spain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured —Continued				
Potassic	3,161	246	--	France 113; Israel 90; West Germany 35.
Unspecified and mixed	202,687	179,694	141,634	Morocco 18,464; West Germany 7,537; Belgium-Luxembourg 5,490.
Graphite, natural	2,218	1,405	--	Madagascar 700; China 396; West Germany 226.
Gypsum and plaster	5,448	2,925	--	France 1,534; Morocco 824; United Kingdom 550.
Halogens:				
Bromine	256	275	--	France 221; Israel 54.
Chlorine	--	2	1	United Kingdom 1.
Iodine	152	175	--	Japan 145; Chile 30.
Unspecified	29	--		
Lime	291	429	--	Morocco 305; France 113.
Magnesium compounds:				
Magnesite	NA	31,344	500	Greece 17,458; Italy 5,035; United Kingdom 2,961.
Oxides and hydroxides	NA	1,614	104	France 549; West Germany 322; United Kingdom 301.
Other	72,749	45,720	--	Italy 20,272; Greece 19,205; North Korea 2,993.
Mica:				
Crude including splittings and waste	1,430	1,358	119	France 457; India 452; Austria 168.
Worked including agglomerated splittings	180	173	76	Belgium-Luxembourg 30; China 23; France 20.
Nitrates, crude	49,335	17,047	--	All from Chile.
Phosphates, crude thousand tons	2,607	2,399	--	Morocco 2,312; Togo 52; Senegal 26.
Pigments, mineral:				
Natural, crude	NA	191	--	West Germany 92; United Kingdom 54; France 35.
Iron oxides and hydroxides, processed	6,586	6,908	19	West Germany 6,041; France 489; Italy 125.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$5,183	$7,327	$46	Thailand $4,498; India $1,206; Belgium-Luxembourg $290.
Synthetic do	$786	$1,087	$72	Austria $462; Switzerland $210; France $188.
Pyrite, unroasted	139	205	4	Italy 133; Austria 66.
Salt and brine	1,301	1,565	7	Netherlands 828; United Kingdom 487; France 73.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	226	8,332	(1)	Norway 7,158; Italy 775; France 163.
Sodium carbonate, natural and manufactured	3,421	1,730	(1)	Portugal 1,011; Bulgaria 600; France 67.
Sodium hydroxide	145,283	111,201	5	France 55,635; Belgium-Luxembourg 22,206; Bulgaria 8,709.
Sodium sulfate, natural and manufactured	NA	4,603	(1)	Mexico 1,999; France 1,721; West Germany 304.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	129,911	109,359	--	Italy 39,765; Portugal 32,782; Finland 11,811.
Worked	9,892	6,694	36	Italy 4,446; Portugal 1,457; Norway 214.
Dolomite, chiefly refractory-grade	4,430	4,376	--	Norway 2,276; France 1,977; Italy 114.
Gravel and crushed rock	41,036	56,744	--	Morocco 47,024; France 6,637; Portugal 1,744.
Quartz and quartzite	3,745	2,922	1	Yugoslavia 1,379; Sweden 980; West Germany 320.
Sand other than metal-bearing	15,530	20,878	43	Morocco 16,603; France 2,848; Belgium-Luxembourg 1,056.
Sulfur:				
Elemental:				
Crude including native and byproduct	94,116	112,950	5,492	France 75,552; Mexico 31,446.
Colloidal, precipitated, sublimed	266	538	1	West Germany 534.
Dioxide	NA	60	(1)	Italy 42; France 18.

See footnotes at end of table.

Table 4.—Spain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur —Continued				
Sulfuric acid	71,390	130,624	3	Netherlands 62,615; France 27,605; West Germany 20,921.
Talc, steatite, soapstone, pyrophyllite	15,181	10,315	31	France 7,663; Norway 1,541; Belgium-Luxembourg 421.
Vermiculite	NA	40,611	--	U.S.S.R. 31,600; Greece 5,285; Republic of South Africa 3,610.
Other:				
Crude	33,768	23,516	168	Morocco 7,087; U.S.S.R. 5,250; Norway 4,750.
Slag and dross, not metal-bearing	14,381	8,052	12	France 6,644; West Germany 689; Italy 655.
Oxides and hydroxides of barium, magnesium, strontium	242	157	26	France 56; West Germany 41; United Kingdom 16.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	9,901	7,055	45	France 3,925; Italy 1,213; Portugal 598.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	507	677	577	France 91; West Germany 8.
Carbon: Carbon black	14,767	16,333	1,016	France 10,461; Netherlands 2,972; West Germany 1,127.
Coal:				
Anthracite and bituminous thousand tons	5,678	7,045	5,585	Australia 547; Republic of South Africa 371; Poland 358.
Lignite including briquets	6,706	6,811	3	France 6,720; West Germany 88.
Coke and semicoke	561,087	420,254	118,418	East Germany 60,580; United Kingdom 54,631; Poland 47,247.
Gas, natural million cubic feet	r50	56	--	Algeria 34; Libya 21.
Hydrogen, helium, rare gases	81	610	69	France 382; United Kingdom 92; West Germany 43.
Peat including briquets and litter	12,333	16,091	--	West Germany 14,320; Finland 980; United Kingdom 316.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	365,139	296,974	--	Saudi Arabia 99,195; Mexico 55,845; Iran 33,467.
Refinery products:				
Liquefied petroleum gas do	r10,642	11,379	(1)	Saudi Arabia 4,938; Algeria 2,183; France 2,013.
Gasoline do	2,207	6,430	300	Romania 2,908; Belgium-Luxembourg 587; U.S.S.R. 475.
Mineral jelly and wax do	24	28	2	Italy 7; Netherlands 5; West Germany 3.
Kerosine and jet fuel do	r1,044	699	129	Bahamas 236; United Kingdom 149; France 94.
Distillate fuel oil do	3,536	2,851	(1)	U.S.S.R. 1,717; Netherlands Antilles 328; Canada 256.
Lubricants do	1,209	336	45	France 82; United Kingdom 70; Netherlands 36.
Residual fuel oil do	6,597	8,850	2,094	U.S.S.R. 1,741; Netherlands 895; France 772.
Bitumen and other residues do	153	(1)	--	Mainly from France.
Bituminous mixtures do	6	7	1	Nigeria 2; United Kingdom 2.
Petroleum coke do	2,745	3,260	2,713	United Kingdom 385; U.S.S.R. 97; West Germany 30.
Tars and other crude chemicals derived from coal, gas, and petroleum	154,364	118,619	86,678	West Germany 14,189; United Kingdom 7,127; France 6,071.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—The aluminum industry of Spain had a difficult year because of severe financial problems. The industry had expanded in the wake of the first energy crisis; it thus suffered from overcapacity and was burdened with heavy borrowings. Alúminio Español S.A. and Alúmina de España S.A. had an outstanding debt of $900 million, of which $750 million was owed to banks, against assests of $1.4 billion.[2] This led to an application for temporary receivership. When INI, which owns through its largest aluminum company Endasa S.A., 53% of Alúminio Español, agreed to pay the interest due on the loan, imminent bankruptcy was avoided.

Copper Pyrites.—The Aznalcóllar Mine, located near Aznalcóllar in the Province of Seville, remained closed during 1982. Adverse conditions on the metal market forced the management of Sociedad Andalusa de Piritas S.A., owner of the Aznalcóllar Mine, to keep it closed.

Mine development and mill construction at Sotiel were near completion at yearend. Reports indicated possible startup of the mine and mill, owned by Minas de Almagrera S.A., in 1983. The mine was designed to produce 600,000 tons of ore per year; the mill should produce annually 40,000 tons of zinc concentrates with 50% zinc, 10,000 tons of copper concentrates with 20% copper, and 10,000 tons of lead concentrates with 50% lead. In addition, the recovered pyrite was to be used in a 300,000-ton-per-year sulfuric acid plant, to be built in the vicinity of the mine.

Lead and Zinc.—Near the village of Torál de los Vades, area of Ponferrada, Province of León, exploration and evaluation of a lead-zinc deposit continued. Preliminary reports indicated reserves of about 4 million tons of sulfide ores with a combined lead and zinc content ranging between 12% and 14%. Peñarroya and the Government-owned exploration company, Adaro, conducted the exploration. The Adaro involvement was funded through Plan Nacional de Abastecimiento de Materias Primas Minerales (National Plan for Supply of Raw Materials and Minerals). During the exploration Adaro's crews drilled about 50 drill holes with depths ranging between 500 and 1,200 meters. If developed, a new mine could produce annually 10 tons of silver, 15,000 tons of lead, and 20,000 tons of zinc.

Exploration of the Navalmedio lead-zinc deposit near Almaden continued. Reports indicated reserves of lead and zinc ores up to 5 million tons with combined lead and zinc content of 7%. In addition, the ore contains silver. The silver content was said to be significant. Design for a new mine at Navalmedio included a 505-meter-deep shaft with a diameter of 5.5 meters.

Mercury.—With three mines in operation, the Almadén region remained the only producer of mercury in Spain. The region was among the largest world producers of mercury during 1982. Modernization of the Almadén Mine was completed. New excavating and loading equipment was brought into the mine; primary crushing of the ore was transferred underground; the rail transport system was replaced by 5-ton rubber-tired dumpers; rubber-tired shovels were introduced for loading; and a new mining method, roof-caving, replaced the cut-and-fill mining method formerly used. The El Entredicho open cast mine, 17 kilometers east of Almadén, went into regular production in 1982 after starting up operations in 1980. According to reports, the El Entredicho Mine accounted for about 70% of total mercury output of the Almadén enterprise. Reserves, reportedly the richest in the world, should support the present rate of production for another 25 years.

The development continued at Las Cuevas deposit, about 8 kilometers north of Almadén, during 1982. The high-grade ore body lies 60 to 360 meters below the surface. Actual work at the minesite started on a new underground mine in June. The mine will have a ramp over 2 kilometers long, inclined at 14%. In addition, two shafts 2.2 meters wide will be used for ventilation and fill will be transported through a third shaft. Several 24-ton dumpers will be used for transporting ore out of the mine.

Titanium.—The Spanish Government has approved sales of Unión Explosivos Río Tinto S.A.'s 55% stake in Titanio S.A. to Troxide Ltd. of the United Kingdom. The value of the transaction was reported at about $17 million. Titanio's plant, located at Palos de la Frontera, near Huelva, was rated at 45,000 tons of titanium dioxide per year. Unión Explosivos decided to sell its interest because of losses of Titanio. The

new owners believe the performance can be improved by strengthening various aspects of the operation at Palos de la Frontera.

NONMETALS

The activities at facilities for production of nonmetals in Spain were slow. The world economic recession almost completely eliminated exports of nonmetals from Spain.

According to preliminary results of exploration, it appears that an important deposit of phosphate has been discovered in the Fontanarejo area of the Province of Ciudad Real. Without disclosing the formation in which phosphates are found, the report indicated that it extends into the Provinces of Toledo, Cáceres, Badajoz, Sevilla, Córdoba, and Salamanca. The deposits at Ciudad Real are near the surface and open cast mining could be used when production begins sometime in the future. The discovery was significant because Spain is totally dependent on imported phosphate to meet its demand, at a cost of $100 million per year.

MINERAL FUELS

The effort to increase the share of domestic coal, uranium, and natural gas in the total energy consumption of Spain continued during 1982. Spain depended almost totally on imported crude oil and natural gas to meet its energy demand.

Coal.—Evaluation of the lignite deposit at Ginzo de Limia (Orenze) was completed. Reserves of low-grade lignite were reported at 350 million tons.

Petroleum and Natural Gas.—Exploration for liquid and gaseous hydrocarbons continued, mostly offshore in both the Atlantic Ocean and Mediterranean Sea. Results, however, were mixed. The gasfield in the Gulf of Cadiz was too small for profitable production but reserves in the offshore Gaviota Gasfield in the Bay of Biscay and the onshore Sabinánigo Field were reported to be adequate to support profitable production.

Uranium.—Exploration for uranium was concentrated in the granites and in sedimentary deposits of Salamanca, Cáceres, and Badajoz. In addition, areas of Sonia, Molina de Aragón, and the Tagus Basin were targets of operations. With the new discoveries, proven reserves in Spain reportedly totaled 30,000 tons of U_3O_8.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary values have been converted from Spanish Pesetas (Sp.P) to U.S. dollars at the rate of Sp.P125=US$1.00.

The Mineral Industry of Sudan

By Kevin Connor[1]

Outside of activities in the petroleum area, Sudan's mineral industry was in a state of decline throughout 1982. Commercial mining activities consisted of a few small-scale gold mines and production of chromite ore, gypsum, salt, and mica. The estimated 1982 contribution of mineral production was less than 1% of the country's annual gross domestic product. Sudan's deficit trade balance continued to increase and was assessed at $1 billion for 1982,[2] a 30% increase over 1981's total. Major increases in agricultural production and continued strength in the construction and transportation industries resulted in an estimated 2% real growth in the economy. The country's petroleum supply was bought on credit or donated because of the Government's exhausted reserves of available foreign exchange.

Although no petroleum had yet to be produced commercially, over 200 million barrels of proven reserves were identified in the Unity and Talih Oilfields of southern Sudan. In September 1982, it was announced that Sudan's original plans to build a refinery at Kosti would be deferred. Crude oil production from the fields, which was expected to begin by 1985, would be pumped to the Port of Sudan for export. The change in plans, from refining crude oil for domestic consumption to exporting crude oil for its trade value, was determined to be the best alternative for the Government of Sudan to generate badly needed foreign exchange. Plans called for exporting 50,000 barrels per day of crude oil starting in 1985, with the technical option of expanding the output of the pipeline system to be built up to 100,000 barrels per day if warranted at a later date.

The second phase of the Port Sudan Harbor modernization project began in June. The World Bank, which financed the first phase of improvements completed earlier in the year, was also financing the second phase, which was scheduled for completion by early 1984 at an estimated cost of $30 million. Construction of civil works, upgrading of grain handling facilities, and installation of an electrical generation station were planned to be the focus of the second phase of improvements. The Kenana sugar mill and refinery, located along the White Nile River, helped to alleviate power shortage problems in Sudan in 1982. The plant, commissioned in 1980 as the second largest of its kind in the world, was built with some unique features including the ability to generate electricity from the waste sugar cane stocks. In 1982, the plant generated 42 megawatts of electrical power per day over 6 months of operation. Surplus power, which amounted to 32 megawatts, was fed into the national electrical grid system.

Sudan continued to face a total depletion of petroleum fuel stocks throughout 1982, owing to a chronic shortage of foreign exchange with which to purchase supplies. In January, Saudi Arabia donated 3 months of oil supply to Sudan. Petroleum requirements for the second quarter of the year were financed by various local and foreign banks, with low-interest loans totaling $84 million. Further fuel needs were met in late 1982 through a low interest loan from the Faisal Islamic Bank and a gift of 150,000 barrels of crude petroleum from Egypt.

PRODUCTION AND TRADE

Sudan's mineral industry continued to be an insignificant contributor to the country's economy in 1982. Mineral commodities produced were chromite ore, cement, gypsum, mica, salt, and gold. The total value of mineral exports, chiefly of chromite ore, was approximately $3 million, which was less than 1% of the country's total export revenues for the year. Major mineral export markets were Switzerland, the Federal Republic of Germany, the United Kingdom, Egypt, Italy, and Saudi Arabia. Sudan imported a variety of processed minerals and mineral chemicals from the United States. Major import items were petroleum lubricants and iron and steel materials. Sudan imported all finished metal product requirements, shortfalls of cement, and all petroleum and mineral-based fertilizer needs. Except for a petroleum refinery plant located at the Port of Sudan, the country had no mineral processing industries.

Table 1.—Sudan: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
Cement, hydraulic ---- thousand tons	167	182	185	122	[3]142
Chromium: Chromite concentrate, gross weight	18,000	28,176	25,400	25,515	19,000
Gold, mine output, metal content[e] ---- troy ounces	300	300	300	300	400
Gypsum and anhydrite, crude	20,000	10,000	10,000	28,000	28,000
Manganese ore	450	454	363	400	400
Mica, all grades	1,000	2,000	1,500	2,000	[p]165
Petroleum refinery products:					
Gasoline ---- thousand 42-gallon barrels	1,211	1,200	1,118	1,099	1,000
Jet fuel ---- do	199	199			
Kerosine ---- do	193	192	428	308	300
Distillate fuel oil ---- do	3,653	3,700	2,366	2,198	2,000
Residual fuel oil ---- do	1,858	1,900	--	2,419	2,000
Other ---- do	52	60	55	--	--
Refinery fuel and losses ---- do	350	350	299	296	300
Total ---- do	7,516	7,601	4,266	6,320	5,600
Salt	72,000	81,200	80,000	64,253	[p]27,927

[e]Estimated. [p]Preliminary.

[1]Table includes data available through Aug. 8, 1983.

[2]In addition to the commodities listed, modest quantities of a variety of crude construction materials (including clays, stone, and sand and gravel) presumably were produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels. Crude oil was produced from several wells on a testing basis but was not being produced for domestic use or export through yearend 1982.

[3]Reported figure.

Table 2.—Sudan: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	--	2,000	--	All to Netherlands.
Metal, scrap	3,929	230	--	Egypt 226; Ethiopia 4.
Other:				
Ores and concentrates	9,754	10,002	--	Japan 4,500.
Precious metals excluding gold: Scrap, waste, dust value, thousands	$42	--		
Base metals including alloys, scrap	3,981	1,942	--	Egypt 1,378; Japan 397; West Germany 94.
NONMETALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones value, thousands	--	$55	--	All to United Kingdom.
Grinding and polishing wheels and stones	72	--		
Clays and clay products: Crude, unspecified	100	--		
Mica: Crude including splittings and waste	363	20	--	All to Belgium-Luxembourg.
Salt and brine	157	4,002	--	Ethiopia 2,408; Saudi Arabia 1,532; Congo 62.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural	7,430	--		
Other: Crude value, thousands	$7	$60	--	Egypt $38; Saudi Arabia $22.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Lubricants 42-gallon barrels	249,606	413	--	All to Cyprus.
Residual fuel oil do	--	484,095	--	All to Italy.

Table 3.—Sudan: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	5	11	--	West Germany 9; China 2.
Metal including alloys, unwrought and semimanufactures	1,524	1,425	--	France 453; Hong Kong 351; Greece 215.
Copper: Metal including alloys, unwrought and semimanufactures	228	266	--	Italy 158; West Germany 52; United Kingdom 46.
Iron and steel: Metal:				
Steel, primary forms	6,150	3,965	--	Japan 2,337; Belgium-Luxembourg 1,625.
Semimanufactures:				
Bars, rods, angles, shapes, sections	59,305	63,675	--	Republic of Korea 17,494; Japan 15,660; Belgium-Luxembourg 11,856.
Universals, plates, sheets	31,251	40,303	--	Japan 20,375; Belgium-Luxembourg 13,489; Egypt 1,873.
Hoop and strip	12,628	7,692	--	U.S. Virgin Islands 6,432; Belgium-Luxembourg 634; Japan 596.
Rails and accessories	2	29	--	Belgium-Luxembourg 27; Italy 2.
Wire	66,774	1,504	--	China 551; West Germany 463; Belgium-Luxembourg 278.
Tubes, pipes, fittings	2,762	10,117	--	Greece 2,148; Japan 1,419; Republic of Korea 829.
Castings and forgings, rough	248	378	--	Hong Kong 231; United Kingdom 66; China 53.
Lead: Metal including alloys, unwrought and semimanufactures	357	90	--	All from Norway.
Manganese: Ore and concentrate	1,833	696	--	Singapore 517; Djibouti 179.
Nickel: Metal including alloys, semimanufactures	11	10	--	Mainly from West Germany.
Tin: Metal including alloys, unwrought and semimanufactures	13	11	--	Japan 8; United Kingdom 2; West Germany 1.
Zinc: Metal including alloys:				
Unwrought	298	98	--	All from Netherlands.
Semimanufactures	1,074	5,409	--	Japan 3,197; Italy 1,076; Netherlands 725.

Table 3.—Sudan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Other:				
Oxides and hydroxides	899	854	--	West Germany 379; China 193; Hong Kong 90.
Base metals including alloys, unwrought and semimanufactures	--	1	--	All from United Kingdom.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc. value, thousands	$120	$111	--	Netherlands $57; United Kingdom $27; West Germany $17.
Dust and powder of precious and semiprecious stones do	--	$57	--	United Kingdom $32; West Germany $20; Italy $3.
Grinding and polishing wheels and stones	17	167	--	West Germany 79; Italy 24; Czechoslovakia 18.
Asbestos, crude	--	18	--	All from Egypt.
Cement	89,643	202,285	--	Romania 67,015; Yugoslavia 62,707; Greece 49,535.
Chalk	118	100	--	West Germany 50; United Kingdom 50.
Clays and clay products:				
Crude, unspecified	12,469	160	--	Netherlands 80; United Kingdom 47; West Germany 26.
Products:				
Nonrefractory	1,330	47,789	--	Hong Kong 29,214; Italy 18,157.
Refractory including nonclay brick	[1]708	1,727	--	United Kingdom 687; Greece 443; West Germany 280.
Fertilizer materials: Manufactured:				
Ammonia	47	90	--	Netherlands 63; West Germany 25; United Kingdom 2.
Nitrogenous	123,125	69,391	--	Kuwait 30,942; Netherlands 20,039; Yugoslavia 9,878.
Phosphatic	456	--		
Unspecified and mixed	4	4	--	Mainly from United Kingdom.
Graphite, natural	5	--		
Gypsum and plaster	988	--		
Halogens: Unspecified	3	--		
Lime	6,234	319	--	All from West Germany.
Pigments, mineral: Natural, crude	13,420	4,120	--	All from Saudi Arabia.
Salt and brine	3	15	--	France 10; United Kingdom 2.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxides including sodic and potassic peroxides	202	54	--	United Kingdom 43; West Germany 11.
Sodium carbonate, natural	3,000	1,264	--	West Germany 628; China 249; Greece 179.
Sodium hydroxide	5,803	9,620	--	West Germany 5,470; Belgium-Luxembourg 1,600; United Kingdom 1,087.
Stone, sand and gravel: Dimension stone, worked	6	60	--	All from Egypt.
Sulfur:				
Elemental, all forms	187	--		
Sulfuric acid	474	199	--	Netherlands 196; West Germany 3.
Other:				
Crude value, thousands	$5	$55	--	Netherlands $26; United Kingdom $13; North Korea $10.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	275	911	--	Greece 390; United Kingdom 234; China 145.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	11,759	6,580	--	Spain 3,362; Italy 2,178; Singapore 1,000.
Carbon: Carbon black	45	--		
Coke and semicoke	500	--		
Hydrogen, helium, rare gases	16	--		
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	5,068	5,910	--	Saudi Arabia 5,574; Egypt 336.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	4,884	14,581	--	Egypt 9,930; Italy 4,651.
Gasoline thousand 42-gallon barrels	1,901	692	--	Yemen Arab Republic 258; Kuwait 241; Oman 135.
Mineral jelly and wax 42-gallon barrels	1,211	1,188	--	United Kingdom 984; West Germany 189.
Kerosine and jet fuel do	140,864	1,589	--	Kenya 1,519; Tanzania 70.

See footnotes at end of table.

Table 3.—Sudan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Distillate fuel oil thousand 42-gallon barrels	1,377	1,725	--	Kuwait 725; Yemen Arab Republic 598; Oman 361.
Lubricants do	241	126	--	Saudi Arabia 72; Netherlands 21; United Kingdom 17.
Residual fuel oil do	(2)	52	--	Saudi Arabia 45; Kenya 7.
Bitumen and other residues do	24	89	--	Netherlands 38; Italy 20; China 12.
Tars and other crude chemicals derived from coal, gas, and petroleum	525	802	--	United Kingdom 799; Belgium-Luxembourg 2.

[1]Excludes unreported quantity valued at $1,080.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Chromite.—Chromite continued to be Sudan's most important mineral export commodity in 1982.[3] Chromite deposits occur principally in the Ingessana Hills area, Kassala Province, and the Red Sea Hills, with reserve estimates at Ingessana Hills about 1 million metric tons of 53% to 57% chromium oxide (Cr_2O_3) content. The Japanese company Mitsubishi Metal Corp., which had helped delineate the Ingessana Hills deposits during the previous few years under an agreement with the Sudanese Government, canceled any further work plans in late 1982. At that time it was reported that the Arab Mining Co. showed an interest in a proposed project to double Sudan's chromite production from the Ingessana Hills deposits, at a preliminary estimated capital investment cost of $10 million. The Kassala and the Red Sea Hills deposits were still considered uneconomical to exploit.

Gold.—After 2 years of exploration efforts, Minex Inc. of the United States in 1982 formed a joint venture with Sudan's Ministry of Energy and Mining to exploit a gold deposit at the location of an old mine-site in the Red Sea Hills near the Jebeit area. Production was scheduled to begin in mid-1983, with a projected annual production of 50,000 troy ounces. Alluvial gold exploration continued in the south near Kapoeta, through a Sudanese-Belgian joint venture.

Tungsten.—The joint pilot project begun in 1980 between the Government agency, Sudanese Mining Corp., the French Bureau de Recherches Géologiques et Minières, and the Saudi Arabian Government to evaluate the commercial potential of Sudan's tungsten deposits in the Red Sea Mountains near Jebel Ayoub, continued throughout 1982. Based on core drilling results, project officials were estimating reserves of 4 million tons of tungsten ore, and plans were underway late in the year to establish a mining company between the three concerns for the commercial exploitation of the deposits. Other tungsten exploration efforts in northern Sudan were planned for early 1983 by Minex, and the Jordan-based concern, Arab Mining.

NONMETALS

Cement.—The Maspio Cement Corp. continued with expansion work on its Atbara plant in northeast Sudan. A 750-ton-per-day rotary kiln with a single-stage cyclone preheater and Unax cooler were planned for installation by early 1983. A 3- by 9-meter raw mill and 3.5- by 11-meter finishing mill were also under erection and expected to be completed by fall of 1983. F. L. Smidth Co. was supplying equipment and technical assistance. A feasibility study began in mid-1982 for a proposed 500,000-ton-per-year cement plant at Derudeb, southwest of Port Sudan.

MINERAL FUELS

Petroleum.—Chevron Oil Co. of Sudan and the Sudanese Government agreed in September to expedite their crude oil export

program with stepped-up development of a 1,400-kilometer pipeline from the Unity Oilfield to a Red Sea port. This replaced earlier plans for a 25,000-barrel-per-day refinery to be built at Kosti with a 500-kilometer pipeline to the oilfields.[4] This major change in oil development policy was dictated by Sudan's problems concerning the country's balance-of-payments crisis and continuing difficulty with servicing its heavy debt burden. The aim of the policy change was to speed up commercial production with exportation of crude oil by 1985, thereby generating much needed foreign exchange for the Government as quickly as possible. The previous plan to construct a refinery at Kosti, about 225 kilometers south of Khartoum, was to refine the Unity Oilfield production for domestic consumption and alleviate expensive petroleum import costs. However, it was estimated that the refinery would take at least 1 year longer to build than the crude pipeline and would take considerably longer to pay for itself. The alternative pipeline would intially carry 50,000 barrels per day and later could be expanded to a 100,000-barrel-per-day flow of crude if warranted. Two pipelines actually proposed to be constructed were: a 22-inch crude pipeline carrying the export product, and an 8-inch return pipeline to carry kerosine or naphtha for dilution to mix with the viscous crude to improve its transport characteristics.

In the near and mid-term future, petroleum consultants estimated Sudan could have its domestic crude petroleum refined in Europe cheaper than doing it in-country. The cost of building the pipeline was estimated at $1 billion, which would be financed by the White Nile Petroleum Co. White Nile in 1982 was a joint venture of Chevron of Sudan, the Sudan Government, International Finance Corp., and the Arab Petroleum Investment Corp. White Nile planned to solicit bids for constructing the pipeline by early 1983 with award of major contracts and construction operations beginning no later than fall of the same year.

Petroleum Products.—Sudan's General Petroleum Corp., which had for some time been considering an expansion of the country's petroleum products service line system, awarded a contract in October 1982 to Omnium Technique des Transports par Pipeline (OTP) of France to study the feasibility of a 550-kilometer extension of the existing system, into Sudan's eastern provinces. The new pipeline would be an addition to the 800-kilometer, 8-inch existing service line from Port Sudan to Khartoum, with proposed branches at Haiya to points south at Kassala and Gedaref. Increasing demand for petroleum products in the eastern Provinces of Kassala and Blue Nile, where an agricultural industrial development program had been ongoing, triggered the study. The preliminary estimated costs of the extension work was $70 million.

Renovation and modernization work continued on the existing pipeline between Port Sudan and Khartoum. Completion of the work would boost the capacity of the line from 600,000 to 1,000,000 tons of petroleum products a year. OTP was responsible for all engineering aspects of the project. Two of the line's four pumping stations were being reequipped with higher capacity pumps, and a new, fifth pumping station was being built. The estimated final cost of the work was $10 million, and the scheduled completion date of the project was July 1983.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Sudanese pounds (£Sd) to U.S. dollars at a rate of £Sd0.9=US$1.00.

[3]U.S. Embassy, Khartoum, Sudan. Mining in Sudan: An Update. State Department Telegram 03131, Apr. 4, 1983, p. 1.

[4]Oil and Gas Journal. Chevron, Sudan To Expedite Crude Oil Exports. Sept. 20, 1982, p. 84.

The Mineral Industry of Sweden

By Joseph B. Huvos[1]

In 1982, Sweden had only a small mineral industry, but mineral technology was highly advanced. The country was one of the world's largest producers of iron ore and a significant producer of nonferrous metals and minerals. Fossil and nuclear fuels were imported to supplement an ample supply of hydroelectric power.

In 1982, the Swedish economy was still performing poorly. Exports, accounting for over one-quarter of the gross domestic product (GDP) of $98 billion,[2] were still unsatisfactory, mainly because of low economic activity in trading partner countries. In real terms, the GDP was slightly lower than that of 1981. In October, the krona was devalued 16% and during the year the dollar appreciated well over 50% against the krona. While mineral production did not change much, iron ore production decreased drastically.

Important events in Sweden's mineral industry in 1982 included startup of the Luossavaara Kiirunavaara AB (LKAB) Viscaria copper mine, Kiruna iron ore pelletizing plant, and Cementa AB's Filehajdar limestone quarry. Boliden AB's Svardsjö Mine resumed operation, and a new sublevel caving method and so-called olivine-fluxed iron ore pellets were introduced by LKAB at Kiruna. Construction continued at Scandinaviska Raffinaderi AB's Lysekill petroleum cracking plant. AB Statsgruvor closed its Stollberg metal mine.

PRODUCTION

Indices of Swedish mineral industry production in 1981 and 1982 are shown in the following tabulation (1968=100):

Industry sector	1981	1982[P]
Iron ore mining	72	50
Nonmetallic minerals	80	79
Metal industries	112	121
Mining, quarrying, manufacturing	125	125

[P]Preliminary.

Source: Monthly Digest of Swedish Statistics, No. 3, 1983, p. 13.

Table 1.—Sweden: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
METALS					
Aluminum, unalloyed:					
Primary	82,019	81,955	81,641	82,717	78,898
Secondary	32,005	28,787	23,239	NA	e23,000
Arsenic:					
White, refined[e]	5,400	5,080	4,080	4,000	4,000
Metallic	e700	NA	NA	NA	NA
Bismuth, mine output, metal content	(3)	(3)	(3)	(3)	--
Copper:					
Mine output, metal content	47,611	45,773	r42,785	50,700	54,891
Metal:					
Smelter:					
Primary	53,177	51,655	45,749	60,576	72,504
Secondary	13,830	12,889	10,692	13,259	17,397
Total	67,007	64,544	56,441	73,835	89,901
Refined:					
Primary	52,629	r43,733	r43,164	50,142	50,304
Secondary	11,809	r15,243	r12,549	11,750	e12,000
Total	64,438	r58,976	r55,713	61,892	62,304
Gold:					
Mine output, metal content troy ounces	76,294	e70,000	e70,000	e70,000	77,160
Metal including alloys do	143,617	149,629	143,424	131,143	144,676
Iron and steel:					
Iron ore and concentrate, gross weight:					
Direct-shipping ore thousand tons	NA	15,696	14,300	e14,300	e9,000
Concentrate do	NA	10,473	e12,884	e8,925	e7,138
Total do	21,486	26,169	27,184	23,225	16,138
Metal content of total do	13,994	16,982	17,643	15,073	10,490
Metal:					
Pig iron and sponge iron[4] do	2,481	3,033	2,436	1,720	1,877
Electric-furnace ferroalloys:					
Ferrochromium	166,238	189,299	144,089	145,716	e146,000
Ferrosilicochromium	4,181	28,825	8,335	2,525	e2,600
Ferromolybdenum	1,131	1,365	805	726	e700
Ferrosilicon	652	--	--	--	--
Ferrotungsten	440	500	423	377	e400
Ferrovanadium	616	500	348	129	e100
Silicon metal	8,753	12,929	18,457	14,340	e14,000
Total	182,011	233,418	172,457	163,813	e163,800
Steel, crude thousand tons	4,325	4,628	4,232	3,765	3,900
Semimanufactures:					
Bars, rods, sections do	1,228	1,241	1,190	1,159	1,106
Plates and sheets do	1,401	1,046	1,202	1,139	1,271
Strip do	93	147	734	665	782
Rails and accessories do	62	52	49	38	--
Pipe and tube stock do	201	170	178	150	44
Other including castings and forgings do	560	675	216	82	168
Total do	3,545	r3,331	3,569	3,233	3,371
Lead:					
Mine output, metal content	81,900	81,626	72,200	84,100	80,800
Metal:					
Smelter, primary	26,900	22,600	20,300	17,600	29,600
Refined:					
Primary	r26,900	22,675	20,300	17,600	29,600
Secondary	18,143	18,962	22,000	10,000	19,900
Total	r45,043	41,637	42,300	27,600	49,500
Selenium, elemental, refined	56	57	51	44	e44
Silver:					
Mine output, metal content thousand troy ounces	5,007	5,649	5,112	5,337	5,626
Metal including alloys do	7,692	9,473	7,666	6,825	7,966
Tungsten, mine output, metal content	317	371	327	371	275
Uranium oxide (U_3O_8)[e]	80	NA	NA	NA	NA
Zinc, mine output, metal content	162,800	169,854	167,400	180,900	185,000

See footnotes at end of table.

Table 1.—Sweden: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
NONMETALS					
Cement, hydraulic[5] thousand tons	2,351	2,387	2,445	2,318	2,302
Chalk	32,096	35,822	33,739	34,376	e34,000
Clays: Kaolin	344	327	357	289	e300
Feldspar, salable, crude and ground	53,845	r58,655	57,999	40,341	e40,000
Lime: Quicklime, hydrated lime, dead-burned dolomite thousand tons	748	r776	744	642	e650
Nitrogen: N content of ammonia do	96	89	86	79	77
Phosphate rock (byproduct):					
Gross weight do	83	58	88	124	131
P_2O_5 content do	32	23	34	48	50
Pyrite and pyrrhotite (including cuprous), gross weight do	484	448	396	419	426
Sodium compounds:					
Sodium carbonate[e]	900	1,000	1,000	1,000	1,000
Sodium sulfate[e]	105,000	105,000	105,000	105,000	105,000
Stone, sand and gravel:					
Dimension stone:					
Unworked:					
Limestone and marble thousand tons	24	20	22	27	NA
Granite and gneiss do	65	67	92	115	NA
Quartz do	r15	16	6	5	NA
Quartzite do	rNA	NA	NA	118	NA
Micaceous schist do	17	17	17	17	NA
Sandstone do	34	35	--	--	NA
Other do	17	17	14	11	NA
Worked, all types[6] do	62	60	56	56	NA
Crushed and broken stone:					
Clay slate do	43	48	48	48	NA
Dolomite:					
Crude do	372	354	326	369	NA
Burnt do	21	17	7	7	NA
Granite and gneiss do	8,180	8,807	8,666	9,212	NA
Limestone:					
For cement manufacture do	1,642	2,222	1,840	1,352	NA
For lime manufacture do	812	596	910	841	NA
For other industrial uses including lime marl do	3,001	r3,809	4,181	4,282	NA
Quartz do	15	15	14	8	NA
Quartzite do	r71	91	61	115	NA
Sandstone do	r216	234	227	164	NA
Other do	975	1,138	1,251	1,100	NA
Sulfur:					
S content of pyrite do	233	282	249	e249	e249
Byproduct:					
From metallurgy[e] do	130	130	130	130	130
From other sources do	e33	36	37	38	40
Total do	e396	448	416	e417	e419
Sulfuric acid do	779	754	647	824	e800
Talc and steatite	21,322	17,746	15,856	15,581	e15,000
Other, crude[7]	4,219	4,811	9,069	5,289	NA
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	25,497	26,029	26,727	25,752	e25,000
Coal, all grades thousand tons	9	e9	e9	--	--
Coke, metallurgical do	853	1,136	1,186	1,101	e1,000
Oil shale:					
For fuel production use do	r13	r3	(3)	--	--
For other use do	(3)	(3)	(3)	--	--
Peat:					
For agricultural use do	95	174	134	131	e131
For fuel use do	(3)	--	--	--	--
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	21,048	20,944	23,146	20,128	19,592
Jet fuel do	1,148	1,440	1,424	1,320	1,320
Kerosine do	68	85	39	116	140
Distillate fuel oil do	39,012	42,340	44,797	34,532	33,107
Residual fuel oil do	43,293	48,335	55,122	35,718	31,715
Lubricants do	214	168	266	329	e270
Other:					
Liquefied petroleum gas do	1,508	1,160	1,102	940	916
Naphtha do	511	1,113	1,003	1,802	1,360

See footnotes at end of table.

Table 1.—Sweden: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981	1982[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum refinery products —Continued					
Other —Continued					
White spirit thousand 42-gallon barrels	[r]1,504	807	578	68	[e]42
Asphalt and bitumen do.	3,333	4,012	3,400	3,139	3,030
Unspecified do.	--	182	182	--	[e]749
Refinery fuel and losses do.	[r]2,824	2,171	2,338	2,188	2,498
Total do.	[r]114,463	[r]122,757	[r]133,397	100,280	94,739

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through Aug. 23, 1983.

[2]In addition to the commodities listed, cobalt, nickel (as nickel sulfate), and metallic titanium are also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Revised to zero.

[4]Production of sponge iron is as follows, in thousand tons: 1978—15 (revised); 1979—not available; 1980—not available; and 1981—not available.

[5]Includes clinker as follows, in thousand tons: 1978—15; 1979—1; 1980—nil; 1981—nil; and 1982—nil.

[6]Represents material for sale, not that produced.

[7]Includes strontium minerals, unspecified minerals, and fragments of ceramic materials.

TRADE

In 1982, the United States was Sweden's third largest supplier of all goods after the Federal Republic of Germany and the United Kingdom, and was Sweden's fifth most important market, after the Federal Republic of Germany, Norway, the United Kingdom, and Denmark.

Exports to the United States in 1981 included more than 100,000 tons of ferrochrome, 15,000 tons of ferrosilicon, 300,000 tons of steel in primary forms, and 900,000 tons of steel semimanufactured goods. Also, 90,000 tons of lead ores and 350,000 tons of zinc ores were shipped. The United States delivered some molybdenum ore, barites, crude phosphates, coal and coke, and crude oil.

Table 2.—Sweden: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	3	8	7	NA.
Aluminum:				
Ore and concentrate	27	5	--	All to South Korea.
Oxides and hydroxides	569	621	2	West Germany 201; Finland 154; Denmark 126.
Metal including alloys:				
Scrap	2,364	2,257	--	West Germany 623; Denmark 345; France 244.
Unwrought	17,726	37,754	--	Netherlands 13,429; Norway 5,450; United Kingdom 4,869.
Semimanufactures	50,940	45,539	695	Denmark 7,223; United Kingdom 6,463; Norway 5,987.
Cadmium: Metal including alloys, all forms	30	--		
Chromium:				
Ore and concentrate	31	5	--	All to Norway.
Oxides and hydroxides	17	67	NA	Norway 47.
Metal including alloys, all forms	1	--		
Cobalt:				
Oxides and hydroxides	(1)	2	--	Mainly to Yugoslavia.
Metal including alloys, all forms	103	342	8	Finland 240; United Kingdom 40; West Germany 14.

See footnotes at end of table.

Table 2.—Sweden: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate	6,895	21,902	--	Finland 10,507; U.S.S.R. 7,403; East Germany 3,992.
Ash and residue containing copper	15,662	14,427	--	Belgium-Luxembourg 12,876; East Germany 1,539.
Metal including alloys:				
Scrap	1,837	1,011	--	Denmark 539; West Germany 379; Switzerland 36.
Unwrought	21,044	34,932	1,094	United Kingdom 11,949; Belgium-Luxembourg 10,067; West Germany 5,435.
Semimanufactures	72,162	73,179	14,071	West Germany 10,019; Denmark 8,209; Norway 7,964.
Gold:				
Waste and sweepings value, thousands	$20,860	$14,000	$19	West Germany $8,638; Switzerland $2,859; United Kingdom $1,985.
Metal including alloys, unwrought and partly wrought do	$85,600	$68,234	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	20,998	17,709	79	Belgium-Luxembourg 4,528; West Germany 3,437; France 3,051.
Pyrite, roasted	249,954	305,648	--	United Kingdom 218,547; West Germany 76,769.
Metal:				
Scrap	16,231	13,830	--	West Germany 5,036; Denmark 2,332; Italy 975.
Pig iron, cast iron, related materials	r279,581	143,568	5,241	United Kingdom 21,130; West Germany 14,890; Denmark 13,686.
Ferroalloys:				
Ferrochromium	92,305	105,641	9,310	United Kingdom 28,379; West Germany 26,389; Italy 24,630.
Ferromanganese	1,025	770	--	Finland 295; Turkey 95; Italy 90.
Ferromolybdenum	760	794	--	United Kingdom 231; Yugoslavia 126; Hungary 60.
Ferrosilicochromium	1,125	182	--	Brazil 85; Finland 40; United Kingdom 34.
Ferrosilicomanganese	--	80	--	Finland 49; Norway 31.
Ferrosilicon	3,683	15,160	NA	Italy 6,585; Belgium-Luxembourg 3,500; United Kingdom 2,488.
Unspecified	1,611	2,155	36	Netherlands 1,137; West Germany 327; Austria 164.
Steel, primary forms	424,386	302,720	35,286	West Germany 91,982; United Kingdom 48,250; Portugal 33,419.
Semimanufactures:				
Bars, rods, angles, shapes, sections	644,301	681,911	33,542	West Germany 135,300; United Kingdom 64,151; Norway 61,323.
Universals, plates, sheets	625,568	608,571	79,047	West Germany 127,550; Norway 120,244; Denmark 69,652.
Hoop and strip	97,636	90,467	5,775	West Germany 17,153; Denmark 8,501; Norway 7,520.
Rails and accessories	37,427	27,689	--	Norway 17,317; India 4,160; West Germany 2,441.
Wire	65,406	62,839	8,921	West Germany 11,355; Finland 7,469; Denmark 5,138.
Tubes, pipes, fittings	230,902	235,636	20,217	West Germany 39,975; United Kingdom 22,446; U.S.S.R. 21,323.
Castings and forgings, rough	2,239	2,388	5	Finland 871; Denmark 777; Norway 320.
Lead:				
Ore and concentrate	56,788	91,349	--	West Germany 63,342; Belgium-Luxembourg 13,755; United Kingdom 6,007.
Oxides	181	209	--	NA.
Metal including alloys:				
Scrap	65	23	--	Denmark 19; Finland 4.
Unwrought	42,610	26,360	--	West Germany 8,738; Belgium-Luxembourg 8,320; Finland 4,608.

See footnotes at end of table.

Table 2.—Sweden: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys —Continued				
Semimanufactures	469	577	1	Saudi Arabia 196; Norway 135; United Kingdom 68.
Magnesium:				
Metal including alloys:				
Scrap	307	443	69	West Germany 268; Denmark 78; Norway 28.
Unwrought	3	1	--	Mainly to West Germany.
Semimanufactures	4	--		
Manganese:				
Ore and concentrate, metallurgical-grade	7	115	--	Denmark 59; South Korea 52.
Oxides	206	33	--	Denmark 31.
Metal including alloys, all forms	77	79	NA	Finland 54; Czechoslovakia 22.
Mercury 76-pound flasks	841	261	--	United Kingdom 145; Denmark 30; Norway 29.
Metalloids:				
Phosphorus	104	193	NA	West Germany 114; Philippines 26; United Kingdom 14.
Silicon value, thousands	$18,113	$19,514	NA	NA.
Unspecified	894	720	NA	NA.
Molybdenum:				
Ore and concentrate	1,330	1,691	--	Netherlands 907; West Germany 328; United Kingdom 132.
Oxides and hydroxides	150	22	--	All to West Germany.
Metal including alloys, all forms	2	38	NA	West Germany 34.
Nickel: Metal including alloys:				
Scrap	503	524	--	Finland 198; India 145; United Kingdom 98.
Unwrought	1,906	1,397	36	Netherlands 1,211; Finland 48; United Kingdom 45.
Semimanufactures	1,347	1,403	63	France 426; Canada 249; West Germany 119.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified value, thousands	$7,942	$4,149	$240	United Kingdom $2,106; Switzerland $678; Finland $518.
Silver:				
Ore and concentrate[2] do.	$19	$28	--	All to Finland.
Waste and sweepings[2] do.	$53,677	$28,464	$351	West Germany $13,649; United Kingdom $9,399; Switzerland $2,988.
Metal including alloys, unwrought and partly wrought thousand troy ounces	7,780	6,334	(1)	Mainly to West Germany.
Tin: Metal including alloys:				
Scrap	5	7	--	All to Norway.
Unwrought	58	176	--	United Kingdom 77; Finland 69; Norway 9.
Semimanufactures	27	25	(1)	Saudi Arabia 17; Denmark 2; Finland 2.
Titanium:				
Ore and concentrate	23	47	--	Finland 24; United Kingdom 16.
Oxides	32	13	--	Turkey 11.
Metal including alloys, all forms	278	413	88	United Kingdom 216; West Germany 103.
Tungsten:				
Ore and concentrate	330	691	--	West Germany 260; France 157; United Kingdom 116.
Oxides and hydroxides	12	21	--	All to West Germany.
Metal including alloys, all forms	46	46	5	Netherlands 12; France 9; Belgium-Luxembourg 6.
Vanadium: Oxides and hydroxides	--	2	--	NA.
Zinc:				
Ore and concentrate	351,941	360,489	--	Norway 99,243; West Germany 86,027; France 49,329.
Oxides	478	372	NA	Finland 190; Norway 139; Denmark 39.
Ash and residue containing zinc	21,294	28,965	--	Norway 23,888; West Germany 4,019; Belgium-Luxembourg 373.
Metal including alloys:				
Scrap	3,325	3,653	--	Norway 2,401; West Germany 437; United Kingdom 296.
Unwrought	342	1,113	--	Norway 642; United Kingdom 288; Denmark 120.
Semimanufactures	71	23	--	West Germany 15; Denmark 4; Finland 3.

See footnotes at end of table.

Table 2.—Sweden: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Zirconium: Metal including alloys, all forms	13	2	--	All to West Germany.
Other:				
Oxides and hydroxides	200	95	--	West Germany 22; Iran 20; East Germany 12.
Ashes and residues	r1,251	4,916	--	Belgium-Luxembourg 3,508; Norway 635; West Germany 400.
Pyrophoric alloys	46	124	NA	West Germany 102; Denmark 7; Belgium-Luxembourg 5.
Base metals including alloys, all forms	160	390	7	United Kingdom 305; Netherlands 30; Ireland 20.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	30	13	--	Norway 11; Finland 1.
Artificial:				
Corundum	44	173	39	West Germany 69; Austria 57.
Silicon carbide	121	416	NA	West Germany 270; United Kingdom 106; Denmark 20.
Dust and powder of precious and semi-precious stones including diamond value, thousands	$126	$24	--	Netherlands $14; Switzerland $7.
Grinding and polishing wheels and stones	2,512	2,163	7	Finland 291; U.S.S.R. 283; United Kingdom 283.
Asbestos, crude	14	1	--	All to Norway.
Barite and witherite	--	25	--	All to West Germany.
Boron materials:				
Crude natural borates	--	12	--	Do.
Oxides and acids	47	16	--	Norway 15.
Cement	348,512	318,820	150	Nigeria 148,198; Venezuela 122,485; West Germany 24,921.
Chalk	10,210	10,586	--	Norway 3,609; Finland 3,490; Republic of South Africa 2,004.
Clays and clay products:				
Crude, unspecified	3,188	2,649	--	Norway 1,119; West Germany 742; Finland 588.
Products:				
Nonrefractory	23,778	29,168	437	Norway 8,484; Belgium-Luxembourg 3,935; Iraq 3,186.
Refractory including nonclay brick	59,057	58,877	1,097	Norway 15,409; Finland 13,157; West Germany 7,804.
Cryolite and chiolite	2	2	--	Finland 1; West Germany 1.
Diamond:				
Gem, not set or strung value, thousands	$10,197	$11,682	$180	Finland $4,178; Norway $3,590; Belgium-Luxembourg $2,185.
Industrial do	$50	$73	--	United Kingdom $50; Belgium-Luxembourg $17.
Diatomite and other infusorial earth	81	698	--	Belgium-Luxembourg 648; West Germany 24; Egypt 11.
Feldspar, fluorspar, related materials, unspecified	30,336	30,151	76	United Kingdom 10,687; East Germany 9,400; Austria 3,240.
Fertilizer materials:				
Crude, n.e.s	1,743	4,149	--	Saudi Arabia 2,562; Norway 1,024; Denmark 539.
Manufactured:				
Ammonia	84	382	NA	Norway 374.
Nitrogenous	39,084	37,500	19,388	Ireland 2,162; United Kingdom 2,008; Denmark 890.
Phosphatic	32,692	55,574	--	NA.
Potassic	--	2	--	All to Denmark.
Unspecified and mixed	8,021	5,139	--	Norway 3,730; Finland 446; Denmark 339.
Graphite, natural	47	2,223	40	Finland 1,979; United Kingdom 198.
Gypsum and plaster	266	646	--	Finland 486; Denmark 85; Norway 52.
Halogens: Chlorine	13,482	15,077	NA	East Germany 9,869; France 3,416; Finland 1,287.
Lime	8,092	8,076	NA	Norway 7,448; France 539.
Magnesium compounds: Magnesite	225	169	--	Denmark 71; Norway 67; Portugal 19.

See footnotes at end of table.

Table 2.—Sweden: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Mica:				
Crude including splittings and waste	11	7	--	Netherlands 3; West Germany 2; Greece 1.
Worked including agglomerated splittings	3	1	NA	NA.
Nitrates, crude	5,059	3	--	All to Norway.
Phosphates, crude	60,675	92,595	--	Norway 84,569; Denmark 8,006.
Pigments, mineral: Iron oxides and hydroxides, processed	70	73	19	Norway 34; Denmark 12; West Germany 2.
Potassium salts, crude	--	2	--	All to Denmark.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$393	$406	$34	Belgium-Luxembourg $162; Iceland $49; Finland $39.
Synthetic do.	$13,664	$19,327	$40	Ireland $19,190; Switzerland $41; Belgium-Luxembourg $31.
Pyrite, unroasted	84,705	60,363	--	Turkey 59,792; Denmark 562.
Salt and brine	1,475	4,349	--	Finland 2,309; Denmark 1,020; Norway 942.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	3,692	3,670	NA	NA.
Sodium carbonate, natural and manufactured	89	1,260	NA	United Kingdom 1,073; Norway 96; France 88.
Sodium hydroxide	11,940	9,711	NA	NA.
Sodium sulfate, natural and manufactured	59,453	69,967	NA	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	138,639	130,498	348	West Germany 48,818; Italy 29,923; Denmark 17,851.
Worked	11,569	12,127	148	Denmark 7,430; West Germany 2,269; Norway 1,644.
Dolomite, chiefly refractory-grade	36,446	36,852	--	Saudi Arabia 9,741; Netherlands 8,536; Denmark 7,522.
Gravel and crushed rock thousand tons	1,525	1,409	--	Denmark 736; West Germany 610; Norway 59.
Limestone other than dimension	953,000	786,190	--	Finland 609,746; Denmark 85,552; West Germany 78,832.
Quartz and quartzite	103,092	95,270	52	Norway 85,384; West Germany 2,360; Denmark 1,165.
Sand other than metal-bearing	72,259	145,971	--	Norway 63,965; West Germany 47,230; Denmark 32,026.
Sulfur:				
Elemental: Crude including native and byproduct	29,513	22,888	--	France 14,147; United Kingdom 6,983; Finland 1,011.
Dioxide	14,528	20,913	NA	Finland 12,247; West Germany 5,287; Norway 1,917.
Sulfuric acid	14,760	24,331	--	Denmark 9,003; Algeria 8,405; Finland 3,984.
Talc, steatite, soapstone, pyrophyllite	5,649	6,378	--	United Kingdom 2,920; Netherlands 2,325; Norway 746.
Other:				
Crude	9,346	10,878	(1)	Norway 4,319; Finland 2,777; Denmark 2,151.
Slag and dross, not metal-bearing	83,342	155,973	(1)	United Kingdom 58,557; Finland 58,226; Norway 14,800.
Oxides and hydroxides of barium, magnesium, strontium	35	76	NA	Denmark 35.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	4,801	7,125	NA	Norway 2,013; Finland 1,840; Iraq 1,221.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	10	352	--	Norway 343; United Kingdom 5.
Carbon: Carbon black	8,650	11,125	NA	Finland 3,395; Norway 2,704; East Germany 1,864.
Coal:				
Bituminous	3,994	1,172	--	Denmark 470; Norway 424; Finland 278.
Lignite including briquets	1,129	4	--	All to Denmark.
Coke and semicoke	114,174	232,611	--	Finland 231,198; Denmark 1,310.
Hydrogen, helium, rare gases	580	487	NA	Norway 401; Finland 40; Denmark 22.

See footnotes at end of table.

Table 2.—Sweden: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Peat including briquets and litter	30,234	30,516	6	Denmark 14,432; Norway 12,346; United Kingdom 1,144.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	646	32	--	All to Netherlands.
Refinery products:				
Liquefied petroleum gas:				
Quantity do	81	24	--	Denmark 11; Norway 6; United Kingdom 5.
Value thousands	$18,662	$19,985	$1,303	United Kingdom $18,242; France $440.
Gasoline:				
Aviation thousand 42-gallon barrels	--	2	--	All to Finland.
Motor do	6,593	3,905	--	Denmark 1,966; Norway 1,068; United Kingdom 522.
Mineral jelly and wax do	5	4	--	Norway 3.
Kerosine and jet fuel do	377	21	--	Denmark 14; Finland 3; West Germany 3.
Distillate fuel oil do	8,318	9,671	--	Denmark 4,015; West Germany 2,147; Norway 1,907.
Lubricants do	495	587	(1)	Norway 158; United Kingdom 109; Netherlands 92.
Residual fuel oil do	17,608	14,378	--	Denmark 5,156; United Kingdom 3,257; West Germany 1,109.
Bitumen and other residues do	447	685	--	Denmark 281; Norway 174; Finland 141.
Bituminous mixtures do	35	40	(1)	Belgium-Luxembourg 5; Norway 5; Netherlands 4.
Tars and other crude chemicals derived from coal, gas, and petroleum	166,296	136,056	--	Netherlands 118,825; Denmark 14,841; West Germany 1,200.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]Excludes quantity valued at $6,224,000.

Table 3.—Sweden: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	32	31	(1)	Brazil 15; West Germany 8; Austria 4.
Aluminum:				
Ore and concentrate	65,335	40,967	--	Australia 24,593; Guyana 4,960; West Germany 3,664.
Oxides and hydroxides	235,062	215,498	520	West Germany 70,377; Jamaica 56,002; Australia 30,138.
Metal including alloys:				
Scrap	3,507	2,960	--	Norway 1,285; Netherlands 554; United Kingdom 459.
Unwrought	36,868	38,687	151	Norway 31,246; United Kingdom 1,854; Denmark 1,801.
Semimanufactures	52,012	60,763	3,899	West Germany 17,571; Norway 5,990; France 4,915.
Antimony: Metal including alloys, all forms	14	25	--	United Kingdom 14; Bolivia 5; China 5.
Beryllium: Metal including alloys, all forms value, thousands	$23	$3	--	West Germany $2; Denmark $1.
Cadmium: Metal including alloys, all forms	268	186	--	Finland 85; Japan 60; Norway 40.

See footnotes at end of table.

Table 3.—Sweden: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate	332,328	406,996	--	Finland 158,302; Turkey 50,844; U.S.S.R. 41,391.
Oxides and hydroxides	432	411	(1)	West Germany 326; Poland 60; China 15.
Metal including alloys, all forms	144	200	--	United Kingdom 106; France 77; West Germany 11.
Cobalt:				
Oxides and hydroxides	2	2	(1)	France 1.
Metal including alloys, all forms	487	555	12	Finland 283; Belgium-Luxembourg 189; United Kingdom 22.
Columbium and tantalum:				
Ore and concentrate	--	14	--	Zaire 12; Australia 2.
Metal including alloys, all forms, tantalum value, thousands	$58	$39	$19	Switzerland $10.
Copper:				
Ore and concentrate	46,870	89,062	1,320	Mexico 34,837; Norway 31,999; Chile 10,806.
Matte and speiss including cement copper	8,009	10,830	--	France 10,798; Finland 32.
Oxides and hydroxides	445	375	--	Norway 178; Yugoslavia 106; Belgium-Luxembourg 47.
Sulfate	974	973	--	United Kingdom 526; Czechoslovakia 163; Norway 121.
Ash and residue containing copper	15,029	5,794	--	West Germany 3,923; Norway 1,222; France 429.
Metal including alloys:				
Scrap	4,988	3,339	342	Norway 1,149; France 612; United Kingdom 514.
Unwrought	76,805	65,781	72	Zambia 16,120; Belgium-Luxembourg 11,366; Chile 10,994.
Semimanufactures	36,333	30,466	515	West Germany 9,443; Finland 3,723; Netherlands 2,676.
Gold:				
Waste and sweepings value, thousands	$417	$838	--	Norway $294; Finland $272; United Kingdom $167.
Metal including alloys, unwrought and partly wrought do.	$11,768	$9,715	$155	United Kingdom $5,518; West Germany $3,048; Switzerland $581.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	513	717	121	United Kingdom 300; Netherlands 296.
Pyrite, roasted	5	--		
Metal:				
Scrap	75,605	246,431	3,672	U.S.S.R. 117,308; United Kingdom 51,075; West Germany 25,154.
Pig iron, cast iron, related materials	55,862	46,402	138	U.S.S.R. 10,993; Canada 6,848; West Germany 6,790.
Ferroalloys:				
Ferrochromium	27,798	23,246	--	Finland 8,586; Albania 3,543; Republic of South Africa 3,194.
Ferromanganese	32,686	33,071	--	Norway 28,644; Republic of South Africa 2,170; France 1,091.
Ferromolybdenum	1,681	1,199	5	Austria 352; Belgium-Luxembourg 323; United Kingdom 253.
Ferronickel	17,530	12,210	--	Vanuatu 4,618; Greece 2,696; Dominican Republic 2,694.
Ferrosilicochromium	3,638	634	--	U.S.S.R. 473; Norway 100.
Ferrosilicomanganese	10,291	9,956	--	Norway 9,456; Republic of South Africa 500.
Ferrosilicon	32,538	24,234	18	Norway 20,594; U.S.S.R. 1,348; West Germany 739.
Unspecified	4,596	3,052	98	U.S.S.R. 645; Belgium-Luxembourg 456; West Germany 340.
Steel, primary forms	145,838	143,831	580	Finland 74,682; West Germany 38,480; United Kingdom 14,806.
Semimanufactures:				
Bars, rods, angles, shapes	468,698	414,112	1,075	West Germany 105,335; Norway 54,202; France 38,545.
Universals, plates, sheets	902,637	818,942	718	West Germany 242,424; Belgium-Luxembourg 124,503; France 99,508.

See footnotes at end of table.

Table 3.—Sweden: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Semimanufactures —Continued				
Hoop and strip	153,289	149,517	130	West Germany 56,499; Poland 22,024; Finland 12,625.
Rails and accessories	3,316	4,143	--	West Germany 2,255; United Kingdom 1,163; Austria 219.
Wire	26,030	25,920	72	Belgium-Luxembourg 5,811; United Kingdom 5,691; West Germany 4,797.
Tubes, pipes, fittings	290,660	258,522	1,055	West Germany 70,696; Denmark 30,390; Finland 30,118.
Castings and forgings, rough	12,317	10,447	2	Poland 3,044; West Germany 1,872; Denmark 1,709.
Lead:				
Ore and concentrate	--	300	--	All from West Germany.
Oxides	2,111	2,365	10	West Germany 1,666; East Germany 340; United Kingdom 309.
Metal including alloys:				
Scrap	3,971	4,342	395	Canada 2,174; Norway 1,465; Nigeria 285.
Unwrought	1,768	8,396	1,006	United Kingdom 4,230; Netherlands 1,996; Finland 610.
Semimanufactures	1,106	1,075	1	West Germany 969; Netherlands 67; Belgium-Luxembourg 30.
Magnesium: Metal including alloys:				
Scrap	3	--		
Unwrought	1,963	1,603	151	Norway 1,443.
Semimanufactures	218	307	6	Switzerland 118; West Germany 100; Austria 40.
Manganese:				
Ore and concentrate, metallurgical-grade	354	531	433	Netherlands 96.
Oxides	791	455	(1)	Belgium-Luxembourg 227; Netherlands 76; West Germany 45.
Metal including alloys, all forms	1,459	708	--	Republic of South Africa 584; France 84; China 31.
Mercury 76-pound flasks	464	667	NA	China 348; Netherlands 203; Finland 58.
Metalloids:				
Arsenic: Metal including alloys, all forms	5	11	--	United Kingdom 10.
Phosphorus	119	34	--	West Germany 33.
Selenium	67	9	--	West Germany 4; United Kingdom 4.
Silicon	518	634	--	Norway 403; France 221; West Germany 7.
Unspecified	1	2	(1)	West Germany 1.
Molybdenum:				
Ore and concentrate	6,014	5,648	2,633	Netherlands 953; Chile 770; United Kingdom 360.
Oxides and hydroxides	44	169	19	Netherlands 59; United Kingdom 59; West Germany 31.
Metal including alloys, all forms	103	43	9	Austria 11; West Germany 7; France 6.
Nickel:				
Ore and concentrate	--	3,600	--	All from Vanuatu.
Matte and speiss	4,453	3,113	--	Austria 2,115; U.S.S.R. 792; Cuba 119.
Metal including alloys:				
Scrap	2,614	2,092	212	United Kingdom 954; West Germany 736; Netherlands 108.
Unwrought	10,805	8,031	874	United Kingdom 2,432; Canada 1,127; Republic of South Africa 950.
Semimanufactures	1,044	1,252	144	United Kingdom 346; Republic of South Africa 310; Canada 168.
Platinum-group metals: Unspecified value, thousands	$69,330	$39,848	$9,823	Switzerland $15,219; United Kingdom $5,661; West Germany $4,228.
Silver:				
Ore and concentrate[2] do	$8,422	$5,474	$140	Canada $2,298; Chile $1,915; France $763.
Waste and sweepings[2] do	$33,999	$6,565	$1,747	Finland $2,004; France $1,483; Norway $557.
Metal including alloys, unwrought and partly wrought thousand troy ounces	14,275	13,953	4,115	West Germany 3,633; United Kingdom 2,411; France 1,929.

See footnotes at end of table.

Table 3.—Sweden: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin: Metal including alloys:				
Scrap	11	3	--	All from Finland.
Unwrought	475	313	(1)	Malaysia 205; Thailand 35; West Germany 31.
Semimanufactures	211	160	(1)	United Kingdom 57; Netherlands 52; West Germany 48.
Titanium:				
Ore and concentrate	3,592	2,050	--	Australia 1,561; India 404.
Oxides	3,613	2,924	92	Norway 1,052; Finland 828; Italy 245.
Metal including alloys, all forms	548	744	62	Japan 316; West Germany 209; U.S.S.R. 153.
Tungsten:				
Ore and concentrate	3,711	2,417	72	Australia 827; China 579; Brazil 418.
Oxides and hydroxides	31	60	--	All from France.
Metal including alloys, all forms	131	29	1	West Germany 11; United Kingdom 6; Japan 4.
Vanadium: Oxides and hydroxides	517	141	--	All from Finland.
Zinc:				
Oxides	1,197	1,209	--	Netherlands 403; Norway 352; United Kingdom 144.
Blue powder	522	547	--	Norway 523; West Germany 20.
Ash and residue containing zinc	10,444	6,485	--	West Germany 6,443.
Metal including alloys:				
Scrap	31	1	--	All from Canada.
Unwrought	37,763	30,509	--	Norway 13,730; Finland 9,812; France 3,318.
Semimanufactures	356	230	(1)	West Germany 128; Poland 43; Norway 21.
Zirconium:				
Ore and concentrate	1,592	1,151	--	Republic of South Africa 895; Australia 244.
Metal including alloys, all forms	128	176	21	France 135; United Kingdom 12; West Germany 8.
Other:				
Ores and concentrates	5,001	10	--	NA.
Oxides and hydroxides	967	819	45	United Kingdom 402; West Germany 177; Belgium-Luxembourg 82.
Ashes and residues	27,411	24,703	790	Spain 11,335; United Kingdom 2,698; Netherlands 723.
Pyrophoric alloys	159	108	--	Norway 63; Netherlands 25; West Germany 8.
Base metals including alloys, all forms	898	383	88	Republic of South Africa 128; Denmark 32; United Kingdom 25.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc.	2,809	473	53	West Germany 158; Italy 127; India 30.
Artificial:				
Corundum	7,217	6,607	1,109	West Germany 4,263; Austria 356; United Kingdom 306.
Silicon carbide	5,492	3,634	8	Norway 3,083; West Germany 478.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$2,619	$1,892	$44	Switzerland $1,384; Republic of South Africa $199; Ireland $139.
Grinding and polishing wheels and stones	3,225	2,985	185	Austria 1,002; United Kingdom 519; West Germany 432.
Asbestos, crude	1,195	1,101	36	Canada 1,064.
Barite and witherite	3,992	4,567	--	West Germany 4,135; China 272; France 70.
Boron materials:				
Crude natural borates	26,776	16,847	12,830	Turkey 2,717; Netherlands 1,300.
Oxides and acids	845	556	76	France 365; Netherlands 60; United Kingdom 40.
Cement	175,727	152,708	709	Poland 103,483; Finland 30,414; Denmark 12,436.
Chalk	32,204	21,809	5	Denmark 7,651; West Germany 7,191; Norway 3,306.
Clays and clay products:				
Crude:				
Bentonite	4,462	3,339	2,654	West Germany 294; United Kingdom 169.
Kaolin	273,914	283,762	22,166	United Kingdom 244,024; Czechoslovakia 8,481; Brazil 5,304.

See footnotes at end of table.

Table 3.—Sweden: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products —Continued				
Crude —Continued				
Unspecified	46,899	36,884	6,982	United Kingdom 19,726; West Germany 4,311; France 3,475.
Products:				
Nonrefractory	34,684	32,329	2	Italy 8,063; Denmark 7,340; West Germany 4,905.
Refractory including nonclay brick	102,955	77,414	637	West Germany 25,034; Austria 19,435; United Kingdom 12,179.
Cryolite and chiolite	501	322	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$25,982	$19,199	$143	Belgium-Luxembourg $11,939; Israel $5,334; United Kingdom $815.
Industrial do	$1,097	$915	$1	Republic of South Africa $321; United Kingdom $297; Netherlands $163.
Diatomite and other infusorial earth	3,805	3,363	1,008	Denmark 1,161; Spain 372; Iceland 320.
Feldspar, fluorspar, related materials:				
Fluorspar	13,008	12,822	--	Mexico 4,408; France 3,674; East Germany 2,176.
Unspecified	12,844	6,709	--	Finland 3,619; Norway 2,881.
Fertilizer materials:				
Crude, n.e.s	1,080	712	--	West Germany 446; U.S.S.R. 118; Denmark 68.
Manufactured:				
Ammonia	154,613	162,789	(1)	Mexico 67,394; Trinidad and Tobago 57,783; U.S.S.R. 24,007.
Nitrogenous	508,944	400,423	NA	Norway 329,132; Netherlands 8,000.
Phosphatic	1,143	121	--	Norway 96; Israel 25.
Potassic value, thousands	$21,480	$20,979	$161	West Germany $9,593; U.S.S.R. $5,197; East Germany $4,648.
Unspecified and mixed	143,891	97,608	192	Norway 87,033; West Germany 6,841; Finland 1,576.
Graphite, natural	911	504	19	West Germany 213; China 125; Austria 52.
Gypsum and plaster	350,445	272,343	88	Spain 153,774; East Germany 68,184; U.S.S.R. 23,121.
Halogens:				
Chlorine	900	1,858	1	Norway 1,857.
Unspecified	11	13	1	Netherlands 6; West Germany 3; Japan 3.
Lime	7,659	4,414	--	West Germany 1,728; Belgium-Luxembourg 1,323; Norway 753.
Magnesium compounds: Magnesite	20,584	21,767	154	Norway 6,101; United Kingdom 2,474; Greece 2,473.
Mica:				
Crude including splittings and waste	408	335	5	Norway 121; France 72; United Kingdom 57.
Worked including agglomerated splittings	79	71	(1)	Switzerland 55; West Germany 8; Belgium-Luxembourg 3.
Nitrates, crude	9,622	3,041	--	Chile 3,018; West Germany 23.
Phosphates, crude	579,657	618,932	114,955	Morocco 262,744; U.S.S.R. 241,185.
Pigments, mineral: Iron oxides and hydroxides, processed	7,096	6,156	56	West Germany 5,341; France 342; United Kingdom 179.
Potassium salts, crude	459	1,026	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1,599	$1,111	$101	Sri Lanka $207; Switzerland $204; Thailand $194.
Synthetic do	$881	$3,367	$1,139	Ireland $2,102; West Germany $31; Israel $24.
Pyrite, unroasted	79,938	21,578	20	Finland 21,498; Italy 27; West Germany 26.
Salt and brine thousand tons	1,157	1,056	(1)	Netherlands 350; West Germany 304; Poland 103.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	967	125	1	West Germany 41; France 36; Belgium-Luxembourg 30.
Sodium carbonate, natural and manufactured	119,008	142,372	17,408	East Germany 35,117; France 30,069; United Kingdom 30,051.

See footnotes at end of table.

Table 3.—Sweden: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s. —Continued				
Sodium hydroxide	217,649	271,975	(1)	West Germany 118,854; East Germany 53,185; Poland 35,067.
Sodium sulfate, natural and manufactured	35,410	36,958	--	Belgium-Luxembourg 16,122; East Germany 9,542; United Kingdom 5,928.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5,334	6,044	--	Finland 2,854; Norway 1,754; Italy 976.
Worked	9,924	7,863	18	Portugal 2,499; Italy 2,277; Poland 1,776.
Dolomite, chiefly refractory-grade	108,971	115,933	725	United Kingdom 58,431; Norway 37,306; Belgium-Luxembourg 13,429.
Gravel and crushed rock	210,696	115,634	344	Finland 66,235; Denmark 25,890; Italy 9,669.
Limestone other than dimension	97,151	62,937	17	United Kingdom 32,411; Denmark 24,719; West Germany 3,939.
Quartz and quartzite	48,033	34,420	--	Spain 28,606; Finland 3,205; Belgium-Luxembourg 1,368.
Sand other than metal-bearing	343,401	314,831	45	Belgium-Luxembourg 151,145; Denmark 117,844; Finland 10,001.
Sulfur:				
Elemental:				
Crude including native and byproduct	41,424	23,250	--	Poland 21,935; France 850; West Germany 201.
Colloidal, precipitated, sublimed	1,138	4,515	--	Poland 4,347; West Germany 122; Denmark 25.
Dioxide	4,243	6,325	NA	Norway 6,307.
Sulfuric acid	162,128	45,026	--	Norway 19,124; Poland 13,107; West Germany 12,683.
Talc, steatite, soapstone, pyrophyllite	36,717	34,853	26	Finland 20,371; Norway 8,262; Belgium-Luxembourg 4,008.
Other:				
Crude	71,614	88,645	133	Norway 64,283; West Germany 20,683; United Kingdom 1,115.
Slag and dross, not metal-bearing	17,488	33,176	20	Netherlands 10,501; Finland 7,484; United Kingdom 5,808.
Oxides and hydroxides of barium, magnesium, strontium	550	1,450	(1)	Norway 1,050; East Germany 277; West Germany 40.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	11,250	13,113	121	United Kingdom 2,765; Norway 2,420; West Germany 1,995.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	780	952	363	Trinidad and Tobago 586.
Carbon: Carbon black	6,802	5,862	390	West Germany 3,246; Netherlands 1,068; United Kingdom 995.
Coal:				
Anthracite	44,949	10,064	1,539	United Kingdom 6,715; West Germany 1,489.
Bituminous thousand tons	2,137	2,018	1,207	United Kingdom 165; U.S.S.R. 157; Poland 57.
Briquets of anthracite and bituminous coal	137	97	15	West Germany 82.
Lignite including briquets	3,463	2,182	--	All from East Germany.
Coke and semicoke	453,350	237,255	2,360	United Kingdom 79,746; West Germany 62,092; Norway 26,975.
Hydrogen, helium, rare gases	3,899	1,645	9	Netherlands 1,143; United Kingdom 165; Finland 84.
Peat including briquets and litter	10,748	45,139	--	Finland 41,012; U.S.S.R. 3,294; Denmark 797.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	131,698	108,120	1,018	Saudi Arabia 50,863; United Kingdom 23,112; Nigeria 10,149.
Refinery products:				
Liquefied petroleum gas do	1,517	1,139	(1)	United Kingdom 509; Saudi Arabia 362; Norway 125.
Gasoline:				
Aviation do	90	82	--	Netherlands 56; United Kingdom 18.
Motor do	21,385	18,225	(1)	Belgium-Luxembourg 3,833; Finland 3,438; Denmark 3,206.

See footnotes at end of table.

Table 3.—Sweden: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Mineral jelly and wax thousand 42-gallon barrels	112	127	1	West Germany 75; Hungary 23; United Kingdom 11.
Kerosine and jet fuel do	2,191	3,366	(1)	Netherlands 1,689; Belgium-Luxembourg 714; France 586.
Distillate fuel oil do	31,954	24,738	(1)	United Kingdom 4,994; U.S.S.R. 4,166; Denmark 3,695.
Lubricants do	2,100	2,150	108	Singapore 402; West Germany 342; Netherlands 323.
Residual fuel oil do	34,394	28,160	2,101	Spain 3,870; United Kingdom 3,351; Italy 2,732.
Bitumen and other residues value, thousands	(3)	$19,215	$5,497	Denmark $9,343; Finland $2,828; West Germany $1,182.
Bituminous mixtures 42-gallon barrels	21,295	23,501	3,818	France 5,727; United Kingdom 5,151; Belgium-Luxembourg 3,630.
Petroleum coke do	231,072	239,305	121,226	United Kingdom 50,215; Norway 37,125; Netherlands 15,681.
Tars and other crude chemicals derived from coal, gas, and petroleum	52,459	46,839	828	West Germany 13,389; Netherlands 9,011; France 7,328.

NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]Import in 1980 was 716,777 barrels.

COMMODITY REVIEW

METALS

Aluminum.—Gränges Aluminium AB, a subsidiary of Gränges AB, operated Sweden's only aluminum smelter, located near Sundsvall on the east coast, at about 96% of capacity. Gränges Aluminium also had a scrap remelting plant at Finspang, central Sweden, producing 35,000 tons of intermediate products. Scandinavia's largest remelting plant at Avesta, central Sweden, produced 15,000 tons of casting alloys for sale to foundries in northern Europe.

Copper.—The Government-owned LKAB mining company started shipping copper concentrates from its new Viscaria Mine in Kiruna. A nominal capacity of 85,000 tons per year of concentrate was to be reached by the end of 1983, and capacity was to be increased to 100,000 tons per year at an unspecified later date. LKAB invested some $50 million in the mine, which has reserves for up to 25 years. Mining is 200 meters below the surface, with ore reaching a depth of 600 meters. About 40% of the ore grades 2.5% to 3% copper.

Boliden has reached an agreement with the Swedish Board of Government Mining Properties for expanding the ore base at the Stekkenjokk Mine, located in northwest Sweden. The two will share the cost of $10 million for the 4-year exploration. Boliden, which leases the mine, will carry two-thirds of the cost. The Swedish Government will contribute 50% of the cost of $2 million for prospecting at Boliden's Skellefteå copper-lead-zinc mine, located near Boliden.

BP Mineral Ltd., a subsidiary of British Petroleum Co. Ltd. (BP), has become the first non-Swedish company in 70 years to get exploration and mining rights in Sweden. The Swedish Government approved BP's application to participate with the LKAB iron ore company in exploring for nonferrous metals on 17,000 hectares in south-central Sweden, between Falun and Derebro. Under Swedish law, the Government has rights to 50% of the ore mined and a further 25% would go to LKAB,

leaving 25% to BP.

Gold.—Development work continued at Boliden's Enåsen gold mine in northern Halsingland, central Sweden, which was to open by 1984. The mine was to produce 300 to 400 kilograms, or about 12,000 troy ounces, of gold per year for 7 years. Exploration and test mining of the Holmtjärn deposit, about 50 kilometers west of Boliden, central Sweden, was begun.

Iron Ore.—Swedish iron ore production decreased about 30% during 1982. Exports of Swedish iron ore were down nearly to the 1949 level. The Lappland mines accounted for 91% of export deliveries. Iron ore production had to be halted for a total of 15 weeks in Kiruna, 13 weeks in Svappavaara, and 10 weeks in Malmberget. At Kiruna, a new pelletizing plant was started, raising LKAB's pelletizing capacity to 9 million tons per year, but only 40% of that capacity was utilized. A new sublevel caving method was introduced at Kiruna, resulting in lower waste rock dilution.

A new type of high-quality, olivine-fluxed iron ore pellets was introduced and about 2 million tons was produced. Reportedly, these pellets have resulted in lower coke consumption and improved pig iron quality in iron blast furnaces.

LKAB operated four iron ore mines in Swedish Lappland: Kiruna, Svappavaara, Tuolluvaara, and Malmberget. Government-owned Svenskst Stål AB (SSAB) operated two iron ore mines in the Bergslagen area in central Sweden at Grängesberg and Dannemora. Total iron ore reserves in the Lappland area totaled about 3.4 billion tons, with about 2 billion tons of recoverable reserves.

Iron and Steel.—Sweden's proposed stainless steel merger was expected to lead to a rapid rationalization within the industry. Avesta Jernverks AB, Fagersta AB, Sandvik AB, and Uddeholm AB would concentrate their production of raw stainless steel, semimanufactures, and plates at one site in the future. Production of stainless billets would be concentrated at Sandvik. Hot rolling would be distributed between Degerfors and Avesta. Avesta's No. 1 cold mill was expected to close, and production was to be shifted to Nyby Uddeholm AB's Torshälla plant. Although the regrouping was planned for January 1, 1984, 1 additional year could be necessary.

After the formation of Fagersta Sandvik Tube AB, combining the stainless tube activities of the two Swedish steelmakers, an agreement was concluded with a third stainless tubemaker, Nyby Uddeholm, to share some of their resources for facilitating rationalization in production and distribution.

Fagersta and Uddeholm merged their high-speed steel operations in a new joint company, Koster Speedsteel, which will produce 15,000 tons per year of high-speed steel, making it possibly the world's largest producer.

SKF Steel, owner of Lesjöfors AB, a steel strip producer, has joined Uddeholm Stripsteel AB of Bangbro, which itself was created a few years back by Uddeholm and Sandvik.

In 1982, the direct reduction process was used by four Swedish steelmakers: Höganäs AB at its Oxelösund plant for 35,000 tons per year, Sandvik at its Sandviken plant for 24,000 tons per year, Uddeholm at Hagfors for 40,000 tons per year, and SKF Steel at Hofors for 30,000 tons per year. SKF also had at Hofors a 70,000-ton-per-year plasma process pilot plant.

SSAB operated three steelworks: Luleå in north Sweden, Oxelösund in south Sweden, both on the Baltic, and Domnarvet in central Sweden. Total capacity was about 5 million tons per year. In the private sector, about 28 companies produced or processed iron, steel, and ferroalloys. There was only a slight increase in crude steel production in 1982, but exports of steel rose 19% in value and about 10% in volume.

Silver.—Boliden intensified exploration activities at the Dammsjö Lake silver deposit in the Garpenberg-Bergslagen area. A test drift was opened for diamond drilling, and beneficiation tests for the ore were performed.

Zinc.—AB Statsgruvor, a wholly owned subsidiary of LKAB, closed its Stollberg, Bergslagen, lead-zinc-pyrite mine. Activities at the mine's Håksberg head office have been transferred to the company's Yxjöberg Mine. A decision was made by Boliden to resume operations in the Svardsjö Mine 20 kilometers northeast of Falun, in central Sweden. Operations at the Svardsjö Mine were suspended in the early 1970's owing to exhaustion of ore. Prospecting has revealed new reserves sufficient until 1986 and further prospecting continues.

NONMETALS

Cement.—A weak Swedish market and increased imports from Eastern Europe caused underutilization of cement capacity at the three plants of Cementa AB, Swe-

den's only cement operator. Plants at Degerhamn, Skövde, and Slite, the former two in central Sweden and the latter on Gotland Island, produced at 77% of capacity. A limestone quarry for cement, providing 25% of consumption at the local plant, started operations on Gotland Island at Filehajdar.

Dolomite.—Deliveries of dolomite for environmental purposes increased in 1982, owing to a greater demand for darker qualities satisfactory only for soil treatment and neutralization of acid in lakes.

Fluorspar.—At Government-owned AB Statsgruvor's Yxjöberg Mine, old stored fluorspar concentrate was reprocessed, yielding acid-grade fluorspar concentrate and off-grade tungsten concentrates.

MINERAL FUELS

In 1982, Sweden derived about 28% of its energy needs from domestic hydroelectric power, black liquor, fuelwood, and waste; 62% from imported oil; and 10% from imported enriched nuclear fuel.

Table 4.—Sweden: Energy balance

(Million tons of oil equivalent)

	Total	Coal and coke	Petroleum and refinery products	Black liquor, fuelwood, waste[e]	Hydroelectric power[1]	Nuclear power[2]
1981						
Production[3]	12.7	--	--	5.5	7.2	--
Imports	42.4	.3	37.7	--	--	4.4
Exports	7.4	.3	6.8	--	.3	--
Apparent consumption	47.8	.1	30.9	5.5	6.9	4.4
1982[p]						
Production[3]	12.3	--	--	5.6	6.7	--
Imports	41.0	.3	35.6	--	.5	4.6
Exports	8.7	.3	8.4	--	--	--
Apparent consumption	44.6	--	27.2	5.6	7.2	4.6

[e]Estimated. [p]Preliminary.
[1]Includes foreign trade of electric power.
[2]Thermal burnoff of imported uranium fuel.
[3]Primary energy only.

Sources: Monthly Digest of Swedish Statistics, Official Statistics of Sweden, Stockholm, and other statistical publications.

Nuclear Power.—In accordance with the Swedish Energy Policy Act of 1980, which prescribed expanding nuclear power to one-half of the nation's generating capacity, work continued on building the necessary spent nuclear fuel and waste storage facility. About 40% of the $2 billion total cost of the waste storage project has been spent to date, mainly on the central storage facility at Oskarshamn. The facility is only temporary, as the final disposal of the waste is to be offshore at Fosmark, north of Stockholm.

In 1982, Sweden had 10 operating nuclear powerplants at 4 locations, with a total capacity of 7,370 megawatts. Two further nuclear powerplants were under construction with a 2,110-kilowatt total capacity for commissioning in 1985 and 1986.

Petroleum.—Ore Prospecting Co. AB, 50% owned by the Government, made a modest profit from about 344 barrels of oil pumped per day on Gotland Island from 23 small holes. Geologic surveys east and southeast of Gotland have indicated a good possibility of oil, but an unresolved border dispute with the U.S.S.R. makes exploration impossible at present. Elsewhere, the Swedish Government was discussing chances for participating in offshore activities in the Soviet sector of the Barents Sea.

In 1982, Sweden had four oil companies operating six oil refineries with a total distillation capacity of 453,000 barrels per day, and a 20,000-barrel-per-day cracking plant was under construction at Scandinaviska Raffinaderi's refinery on the Skagerrak.

[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Swedish kronor (SKr) to U.S. dollars at the rate of SKr6.29 = US$1.00 for 1982.

The Mineral Industry of Switzerland

By Roman V. Sondermayer[1]

Many mineral occurrences are known in Switzerland, but in 1982, few were in active status. Domestic mineral production was limited to construction minerals and salt. In addition, aluminum, iron and steel, and petroleum refinery products were produced from imported raw materials. Hydroelectric power and fuelwood remained the principal sources of primary energy in the country. All coal, natural gas, and crude oil consumed were imported. In addition, to meet demand, some quantities of petroleum refinery products had to be imported.

During 1982, the overall economy of Switzerland was increasingly under the influence of the downturn in the world economy. The gross national product (GNP) declined by 1.5% when compared with the GNP of 1981, to about $90 billion.[2] The mineral industry, including processing of imported raw materials, which is modest by world standards, contributed only about 1% to 2% to the total GNP.

A discovery of natural gas, the first commercial deposit of hydrocarbons discovered in the country, and modernization of aluminum plants were the significant developments in the mineral industry of Switzerland during 1982.

PRODUCTION

The mineral industry of Switzerland is privately owned, except for salt, which was produced by a Government-owned monopoly. Table 1 shows the latest trends in production during 1978-82.

Table 1.—Switzerland: Production of mineral commodities[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum metal, smelter, primary ____tons__	79,468	82,974	86,302	82,202	83,000
Iron and steel:					
Pig iron and blast furnace ferroalloys ____	35	30	e29	30	30
Electric-furnace ferroalloys[e] ____	6	5	5	5	5
Crude steel ____	784	886	e900	966	950
Semimanufactures ____	679	e720	e750	e700	720
NONMETALS					
Cement, hydraulic ____	3,697	3,934	4,252	4,350	4,200
Gypsum[e] ____	70	70	64	85	80
Lime ____	68	70	64	57	60
Nitrogen: N content of ammonia ____	e45	e45	e45	33	33
Salt ____	391	r385	378	431	430
Sodium compounds: Sodium carbonate[e] ___tons__	45,000	45,000	45,000	46,000	45,000
Sulfur, byproduct, all sources ____do____	e3,000	e3,000	3,262	3,364	3,000
MINERAL FUELS AND RELATED MATERIALS					
Gas, manufactured ____million cubic feet__	1,808	1,855	1,789	1,379	1,300

See footnotes at end of table.

Table 1.—Switzerland: Production of mineral commodities[1] —Continued

(Thousand metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	([3])	1,229	1,199	1,092	1,297
Gasoline, all kinds do	7,434	8,381	9,527	10,371	9,041
Jet fuel do	1,604	1,664	1,793	1,851	1,814
Kerosine do	--	39	44	46	41
Distillate fuel oil do	13,457	14,696	15,527	13,201	12,800
Residual fuel oil do	5,354	6,380	4,431	3,615	3,315
Other refinery products do	2,265	906	798	768	756
Refinery fuel and losses do	1,200	2,041	1,896	1,766	1,692
Total do	31,314	35,336	35,215	32,710	30,756

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through July 22, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) are undoubtedly produced, but output is not reported, and available general information is inadequate to make reliable estimates of output levels.

[3]Included in "Other refinery products."

TRADE

The latest trends in foreign trade in minerals of Switzerland are shown in tables 2 and 3. Based on preliminary reports, Switzerland was a net importer of minerals and related products during 1982.

Table 2.—Switzerland: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline and rare-earth metals:				
Alkaline metals kilograms	1,632	684	60	West Germany 130; Japan 49.
Alkaline-earth metals do	212	60	NA	NA.
Rare-earth metals do	3	18	NA	NA.
Aluminum:				
Oxides and hydroxides	1,311	301	16	West Germany 137; Spain 21; Finland 18; Austria 15.
Metal including alloys:				
Unwrought	44,953	44,982	1,270	Italy 18,674; West Germany 16,368.
Semimanufactures	75,260	68,353	878	France 12,536; West Germany 10,995.
Antimony: Metal including alloys, all forms kilograms	363	1,548	--	Mainly to France.
Beryllium: Metal including alloys, all forms do	36	26	6	West Germany 3.
Chromium: Oxides and hydroxides	16	11	([1])	West Germany 4; Austria 2.
Cobalt: Oxides and hydroxides kilograms	509	771	--	Yugoslavia 600.
Columbium and tantalum: Metal including alloys, all forms do	1,373	585	7	West Germany 188; Austria 152.
Copper:				
Sulfate	55	37	--	Mainly to France.
Metal including alloys:				
Scrap	12,075	11,458	--	West Germany 4,456; Austria 1,847.
Unwrought	6,630	4,459	126	West Germany 2,950; Italy 1,149.
Semimanufactures	21,428	18,807	2,421	West Germany 4,656; Italy 2,471; France 2,412.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	[r]17,898	24,843	NA	NA.

See footnotes at end of table.

Table 2.—Switzerland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate	88	222	(1)	Italy 131; Peru 50; West Germany 29.
Metal:				
Scrap	63,738	128,334	--	Italy 108,699; West Germany 11,213.
Pig iron, cast iron, related materials	2,001	2,281	(1)	West Germany 1,486; Poland 100.
Ferroalloys:				
Ferrosilicon	126	112	--	West Germany 66; Peru 20.
Unspecified	596	896	--	Turkey 316; West Germany 230.
Steel, primary forms	9,740	9,503	--	West Germany 7,590; Italy 1,841.
Semimanufactures:				
Bar, rods, angles, shapes, sections	r309,474	302,079	125	West Germany 233,738; Italy 28,482.
Universals, plates, sheets	r36,158	35,277	3	West Germany 26,585; Austria 4,576.
Hoop and strip	r23,472	20,274	3	Austria 9,987; France 4,957; West Germany 4,781.
Rails and accessories	1,086	2,417	NA	Austria 1,517; West Germany 452.
Wire	r17,633	16,501	17	West Germany 8,207; France 4,883.
Tubes, pipes, fittings	157,776	178,540	143	West Germany 62,329; Netherlands 21,029.
Castings and forgings, rough	r17,826	13,516	75	West Germany 5,990; France 2,621.
Lead:				
Oxides	6	6	--	Mexico 3; West Germany 1.
Metal including alloys:				
Scrap	8,174	7,311	--	Italy 2,995; Austria 2,712.
Unwrought	4,063	4,847	--	West Germany 1,893; Italy 1,525.
Semimanufactures	76	55	--	Italy 20; Austria 11.
Magnesium: Metal including alloys, all forms	442	367	16	Sweden 118; West Germany 62; United Kingdom 61.
Manganese: Oxides	15	5	--	Mainly to Sweden.
Mercury 76-pound flasks	262	135	--	West Germany 72; France 25.
Metalloids:				
Oxides and acids	(1)	20	--	Mainly to Italy.
Phosphorus	(1)	19	--	All to Spain.
Silicon	6,526	5,375	50	West Germany 5,234; Austria 65; United Kingdom 19.
Unspecified	1	1	(1)	NA.
Molybdenum: Metal including alloys, all forms	7	13	(1)	Poland 5; West Germany 2; Hungary 2.
Nickel:				
Matte and speiss	180	16	--	West Germany 14.
Metal including alloys:				
Scrap	233	247	--	West Germany 240.
Unwrought	164	15	--	West Germany 14.
Semimanufactures	376	317	3	West Germany 99; France 47.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	591	940	23	Japan 420; West Germany 164; Netherlands 74.
Silver:				
Waste and sweepings[2] value, thousands	$212,092	$197,927	NA	Spain $111,835; France $39,016.
Metal including alloys, unwrought and partly wrought thousand troy ounces	33,419	23,099	NA	NA.
Tin: Metal including alloys:				
Scrap	117	72	--	West Germany 54; France 16.
Unwrought	186	158	--	West Germany 50; Denmark 39.
Semimanufactures	39	38	--	Italy 15; Austria 11.

See footnotes at end of table.

Table 2.—Switzerland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Titanium: Oxides	240	82	(1)	Ivory Coast 33; Austria 14; West Germany 14.
Tungsten: Metal including alloys, all forms	51	49	3	West Germany 26; Belgium-Luxembourg 16.
Uranium and/or thorium: Oxides and other compounds kilograms	2,381	1,997	127	West Germany 313; Hungary 183.
Zinc:				
Oxides	43	3	--	France 1.
Blue powder	172	44	(1)	West Germany 30; Italy 5.
Metal including alloys:				
Unwrought	84	9	(1)	West Germany 5; Denmark 2.
Semimanufactures	10	55	--	West Germany 31; Austria 7.
Other:				
Ores and concentrates	1,025	562	--	Italy 268; Austria 161.
Oxides and hydroxides	324	369	4	West Germany 170; Italy 123.
Ashes and residues	22,124	17,056	--	West Germany 6,373; Belgium-Luxembourg 4,297; Italy 2,860.
Base metals including alloys, all forms	139	184	37	West Germany 92; United Kingdom 19.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	19	62	(1)	Sweden 41; France 16.
Artificial:				
Corundum	169	146	1	West Germany 122; France 9.
Silicon carbide	7,543	6,665	NA	NA.
Dust and powder of precious and semi-precious stones kilograms	2,705	2,910	174	Italy 996; France 392.
Grinding and polishing wheels and stones	1,216	1,309	7	United Kingdom 391; West Germany 189.
Asbestos, crude	43	164	(1)	Turkey 139; Barbados 6; Iraq 6.
Barite and witherite	115	22	--	France 12.
Boron materials:				
Crude natural borates	8	4	--	All to West Germany.
Oxides and acids	12	8	(1)	Yugoslavia 3; United Kingdom 1.
Cement	30,335	43,144	--	West Germany 41,674.
Chalk	2,610	2,859	--	France 2,655.
Clays and clay products:				
Crude: Unspecified	10,287	2,501	(1)	France 1,458; West Germany 861.
Products:				
Nonrefractory	53,335	52,825	3	West Germany 16,580; Austria 11,859.
Refractory including nonclay brick	2,156	903	--	Italy 156; West Germany 106.
Cryolite and chiolite	53	23	--	Mainly to Iran.
Diamond:				
Gem, not set or strung thousand carats	19,035	23,140	2,950	Israel 5,895; West Germany 3,975.
Industrial do	5,465	20,670	320	West Germany 10,260; France 7,320.
Diatomite and other infusorial earth	19	51	(1)	Yugoslavia 27; West Germany 2.
Feldspar, fluorspar, related materials	282	183	--	Peru 80; Portugal 32; Republic of South Africa 31.
Fertilizer materials:				
Crude, unspecified kilograms	91	500	NA	NA.
Manufactured:				
Ammonia	47	150	--	Austria 142.
Nitrogenous	1,304	1,118	--	West Germany 868; Austria 103.
Phosphatic	13	13	--	France 4; Belgium-Luxembourg 1.
Unspecified and mixed	2,159	2,876	6	West Germany 770; France 432.
Graphite, natural	10	25	--	Spain 18.
Gypsum and plaster	4,100	5,647	--	France 4,650; Austria 375.

See footnotes at end of table.

Table 2.—Switzerland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Halogens:				
Chlorine	13,000	9,320	--	NA.
Unspecified	27	36	--	Ireland 24; Bulgaria 3.
Lime	2,091	2,533	--	West Germany 1,893; France 571.
Magnesium compounds:				
Magnesite	35	8	(1)	West Germany 3.
Oxides and hydroxides	(1)	1	(1)	Mainly to Romania.
Mica:				
Crude including splittings and waste	117	27	--	Austria 10; West Germany 7.
Worked including agglomerated splittings	544	561	5	India 87; Sweden 62.
Phosphates, crude kilograms	340	--		
Pigments, mineral:				
Natural, crude	4	--		
Iron oxides and hydroxides, processed	22	49	(1)	France 15; Austria 13.
Potassium salts, crude[3]	24	31	--	Italy 18.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$243,384	$265,688	$26,760	France $59,438; West Germany $33,013.
Synthetic thousand carats	219,585	242,685	4,625	West Germany 63,305; Italy 24,205.
Salt and brine	234	278	--	France 225.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	127	45	--	Italy 21; France 18.
Sodium carbonate, natural and manufactured	64,717	28,873	NA	NA.
Sodium hydroxide	30,687	31,605	(1)	West Germany 17,439; Austria 8,260.
Sodium sulfate, natural and manufactured	793	3,024	--	Italy 2,819; Austria 129; France 57.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	35,218	32,594	--	West Germany 16,029; Italy 11,061.
Worked	20,157	13,777	--	West Germany 11,828; Austria 836.
Dolomite, chiefly refractory-grade	19	11	--	West Germany 6.
Gravel and crushed rock	29,391	26,532	(1)	West Germany 14,337; France 11,117.
Limestone other than dimension	31	--		
Quartz and quartzite	39,356	33,877	(1)	Italy 32,181; West Germany 1,313.
Sand other than metal-bearing	10,375	15,414	--	France 11,592; West Germany 2,540.
Sulfur:				
Elemental:				
Crude including native and byproduct	20	19	--	Mainly to Austria.
Colloidal, precipitated, sublimed	10	8	--	Yugoslavia 3; West Germany 2.
Dioxide	392	454	30	U.S.S.R. 101; West Germany 53.
Sulfuric acid	25,528	20,678	--	West Germany 16,406; Yugoslavia 1,420.
Talc, steatite, soapstone, pyrophyllite	97	152	--	West Germany 53; Austria 38.
Other:				
Crude	3,829	3,883	(1)	West Germany 3,141; Austria 319.
Slag and dross, not metal-bearing	4,009	11,262	--	West Germany 10,632; France 423.
Oxides and hydroxides of barium, magnesium, strontium	17	12	(1)	Argentina 3; Venezuela 2.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	4,481	2,788	21	Austria 1,071; West Germany 339.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	4	--	West Germany 3.
Carbon: Carbon black	224	230	--	France 71; Czechoslovakia 62.
Coal: All grades including briquets	415	2	--	Mainly to West Germany.
Coke and semicoke	37	1,006	--	West Germany 981.

See footnotes at end of table.

Table 2.—Switzerland: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Gas, manufactured	95	105	--	France 103.
Hydrogen, helium, rare gases	39	340	(1)	France 318.
Peat including briquets and litter	1,396	1,495	--	France 843; Austria 534.
Petroleum and refinery products:				
Crude 42-gallon barrels	17	(1)		
Refinery products:				
Liquefied petroleum gas do	r119,195	124,770	--	Italy 69,542; France 27,631.
Gasoline: Motor do	92,185	38,675	--	Austria 38,233.
Mineral jelly and wax do	1,695	1,362	16	Italy 881.
Kerosine and jet fuel do	3,568	528	--	Austria 53.
Distillate fuel oil do	85,198	50,527	--	Austria 50,512.
Lubricants do	37,313	62,944	33	West Germany 15,561; Austria 8,827.
Residual fuel oil do	132,577	122,844	--	Austria 114,572.
Bitumen and other residues do	r15,815	6,408	--	West Germany 1,359; Sweden 772.
Petroleum coke do	7	99	--	Italy 88.
Tars and other crude chemicals derived from coal, gas, and petroleum	1,139	528	7	West Germany 132; Italy 119; France 81.

rRevised. NA Not available.
1Less than 1/2 unit.
2May include platinum-group metals.
3May include some manufactured.

Table 3.—Switzerland: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Alkaline metals	757	494	18	West Germany 466; United Kingdom 4.
Alkaline-earth metals kilograms	r1,090	182	NA	NA.
Rare-earth metals do	r5,718	941	7	Austria 805; United Kingdom 100.
Aluminum:				
Ore and concentrate	5,533	772	--	France 541; West Germany 217.
Oxides and hydroxides	174,010	171,709	262	Australia 136,253; France 17,755; West Germany 16,530.
Metal including alloys:				
Unwrought	54,162	37,574	8	Iceland 10,303; Norway 8,856; France 6,129.
Semimanufactures	50,785	47,482	338	West Germany 20,613; Belgium-Luxembourg 6,720; France 5,813.
Antimony: Metal including alloys, all forms	91	55	--	Bolivia 25; Belgium-Luxembourg 20.
Beryllium: Metal including alloys, all forms	1,250	3,815	3,571	West Germany 220.
Chromium: Oxides and hydroxides	565	498	2	West Germany 385; Italy 77.
Cobalt: Oxides and hydroxides	1	2	--	Belgium-Luxembourg 1.
Columbium and tantalum: Metal including alloys, all forms: Tantalum	1,343	1,102	320	Austria 520; West Germany 148.
Copper:				
Ore and concentrate	21	14	--	All from Belgium-Luxembourg.
Sulfate	733	692	--	France 239; U.S.S.R. 190.

See footnotes at end of table.

Table 3.—Switzerland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Copper —Continued				
Metal including alloys:				
Scrap	3,566	3,762	54	West Germany 1,862; U.S.S.R. 725.
Unwrought	10,565	11,097	169	West Germany 3,821; Belgium-Luxembourg 1,977; Austria 1,522.
Semimanufactures	88,040	78,566	393	West Germany 34,382; France 9,768.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	r20,336	26,392	NA	NA.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	49,431	49,487	3	Mauritania 19,247; West Germany 8,520; Republic of South Africa 7,782.
Metal:				
Scrap	136,853	113,138	--	Mainly from West Germany.
Pig iron, cast iron, related materials	98,961	83,452	1	West Germany 41,103; France 19,184.
Ferroalloys:				
Ferrosilicon	r6,715	5,538	--	France 1,678; West Germany 1,596.
Unspecified	r15,037	11,475	36	West Germany 5,072; Norway 2,839.
Steel, primary forms	r158,027	130,044	--	West Germany 55,427; Belgium-Luxembourg 16,407.
Semimanufactures:				
Bars, rods, angles, shapes, sections	r618,761	593,527	1	West Germany 168,170; Italy 156,266; Belgium-Luxembourg 78,223.
Universals, plates, sheets	r672,195	613,688	218	West Germany 193,603; France 101,625; Belgium-Luxembourg 89,825.
Hoop and strip	r240,143	210,167	367	West Germany 75,399; Belgium-Luxembourg 44,168; France 31,035.
Rails and accessories	53,743	48,571	--	Austria 21,906; West Germany 17,688.
Wire	r38,682	38,328	3	West Germany 7,080; Austria 5,311; Italy 3,613.
Tubes, pipes, fittings	159,601	150,927	166	West Germany 71,484; France 24,965; Italy 18,042.
Castings and forgings, rough	9,006	8,542	10	West Germany 5,061; Romania 839; France 785.
Lead:				
Ore and concentrate	4	--		
Oxides	111	163	--	Mexico 53; United Kingdom 43; Netherlands 15.
Metal including alloys:				
Scrap	2	91	--	West Germany 50; France 40.
Unwrought	17,981	10,155	201	France 3,202; Canada 2,895; United Kingdom 2,173.
Semimanufactures	1,562	1,513	1	West Germany 1,358; Belgium-Luxembourg 110.
Magnesium: Metal including alloys, all forms	2,717	1,436	72	Norway 693; Canada 314; Italy 271.
Manganese: Oxides	786	562	--	Greece 354; Belgium-Luxembourg 134.
Mercury 76-pound flasks	1,106	635	--	West Germany 549; Japan 35.
Metalloids:				
Arsenic: Oxides and acids	6	80	--	Mainly from France.
Phosphorus	2,776	3,157	--	France 923; U.S.S.R. 844; Italy 581.
Silicon	209	22	1	Italy 14; West Germany 7.
Unspecified	6	4	(1)	West Germany 3.

See footnotes at end of table.

Table 3.—Switzerland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Molybdenum: Metal including alloys, all forms	24	20	1	Austria 14; West Germany 2.
Nickel:				
Ore and concentrate	--	2	--	All from Japan.
Matte and speiss	1,340	1,164	100	United Kingdom 207; West Germany 172; Republic of South Africa 162.
Metal including alloys:				
Scrap	164	240	--	West Germany 109; Austria 73; Italy 16.
Semimanufactures	1,445	1,152	233	West Germany 407; United Kingdom 281.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	993	847	112	Netherlands 244; U.S.S.R. 102; West Germany 90.
Silver:				
Waste and sweepings[2] value, thousands	$78,521	$92,184	$16	Sweden $12,757; Spain $11,710.
Metal including alloys, unwrought and partly wrought thousand troy ounces	50,728	28,973	NA	NA.
Tin: Metal including alloys:				
Scrap	11	12	--	Mainly from Italy.
Unwrought	1,026	926	1	Indonesia 520; Thailand 150; Malaysia 120.
Semimanufactures	326	279	1	West Germany 133; France 110.
Titanium: Oxides	3,773	1,826	1	West Germany 725; Finland 297; United Kingdom 279.
Tungsten: Metal including alloys, all forms	113	79	4	West Germany 29; France 26.
Uranium and/or thorium: Oxides and other compounds	14	24	2	France 15; United Kingdom 4.
Zinc:				
Ore and concentrate	10	7	--	All from West Germany.
Oxides	2,596	2,451	21	France 1,268; West Germany 547.
Blue powder	2,806	3,247	(1)	Belgium-Luxembourg 1,252; Netherlands 768; France 646.
Metal including alloys:				
Scrap	21	1	--	Mainly from West Germany.
Unwrought	25,342	21,316	25	West Germany 7,318; Norway 3,604; Netherlands 3,143.
Semimanufactures	1,174	1,011	--	West Germany 495; Belgium-Luxembourg 226.
Other:				
Ores and concentrates	7,650	5,604	--	Republic of South Africa 3,690; West Germany 768.
Oxides and hydroxides	1,384	1,315	4	West Germany 839; France 160.
Ashes and residues	280	439	--	West Germany 336; France 81.
Pyrophoric alloys	4	4	--	Mainly from Austria.
Base metals including alloys, all forms	840	925	300	West Germany 112; France 98.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	979	535	85	Italy 367; West Germany 66.
Artificial:				
Corundum	6,780	6,177	120	West Germany 2,977; Austria 2,240.
Silicon carbide	1,275	863	1	West Germany 471; Norway 346; Italy 32.
Dust and powder of precious and semiprecious stones: Excluding diamond kilograms	3,800	3,950	795	Ireland 2,836; West Germany 143.
Grinding and polishing wheels and stones	1,990	1,716	34	West Germany 940; Austria 204; Italy 177.

See footnotes at end of table.

Table 3.—Switzerland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Asbestos, crude	21,029	16,886	2	Canada 7,410; U.S.S.R. 4,185; Italy 2,283.
Barite and witherite	3,181	2,092	--	West Germany 1,504; France 548.
Boron materials:				
Crude natural borates	11,245	10,729	9,929	Netherlands 441; Turkey 183.
Oxides and acids	532	365	33	France 130; Yugoslavia 79.
Cement	195,527	246,301	51	Italy 114,118; West Germany 50,393; Austria 45,431.
Chalk	23,168	24,299	--	France 20,064; Austria 2,044.
Clays and clay products:				
Crude: Unspecified	180,354	183,161	966	West Germany 82,283; United Kingdom 57,050.
Products:				
Nonrefractory	347,467	381,986	1	Italy 206,532; West Germany 109,403.
Refractory including nonclay brick	47,007	38,035	40	West Germany 22,006; Austria 6,683.
Cryolite and chiolite	618	292	--	Mainly from Denmark.
Diamond:				
Gem, not set or strung thousand carats	191,115	195,245	17,650	Brazil 85,475; West Germany 30,010.
Industrial do	37,630	19,990	530	West Germany 7,560; Brazil 3,440.
Diatomite and other infusorial earth	9,381	11,169	213	Denmark 7,467; Spain 1,781.
Feldspar, fluorspar, related materials:				
Unspecified	12 097	9,754	--	West Germany 3,540; Hungary 2,705.
Fertilizer materials:				
Crude, unspecified	r77	15	NA	NA.
Manufactured:				
Ammonia	21,744	18,166	--	Austria 7,657; France 7,643.
Nitrogenous	89,412	97,885	563	Austria 43,225; West Germany 23,531.
Phosphatic	r143,330	125,954	807	France 83,650; Belgium-Luxembourg 39,784.
Unspecified and mixed	131,245	123,784	9,682	France 47,539; West Germany 22,587.
Graphite, natural	232	149	--	West Germany 80; Austria 27.
Gypsum and plaster	75,344	72,902	--	West Germany 47,434; France 13,836.
Halogens:				
Chlorine	65	435	--	France 385; West Germany 50.
Unspecified	2,008	2,013	--	France 898; East Germany 429.
Lime	56,420	51,030	--	France 27,108; West Germany 23,758.
Magnesium compounds:				
Magnesite	r4,186	4,756	--	Austria 3,221; Spain 1,261.
Oxides and hydroxides	r281	214	28	West Germany 61; France 57.
Mica:				
Crude including splittings and waste	546	655	--	France 206; India 146.
Worked including agglomerated splittings	535	417	(1)	France 247; Belgium-Luxembourg 157.
Phosphates, crude	13,055	9,799	--	Morocco 6,797; Togo 1,052.
Pigments, mineral:				
Natural, crude	357	416	--	West Germany 233; Austria 110.
Iron oxides and hydroxides, processed	2,842	2,572	9	West Germany 2,378; United Kingdom 90.
Potassium salts, crude[3]	87,735	84,517	--	France 53,875; West Germany 23,532.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$329,400	$329,146	$25,973	Belgium-Luxembourg $118,948; United Kingdom $49,812.
Synthetic thousand carats	136,290	128,225	19,305	France 82,890; West Germany 13,890.

See footnotes at end of table.

Table 3.—Switzerland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pyrite, unroasted	10,556	4,924	--	Spain 4,745; West Germany 96.
Salt and brine	1,994	1,755	13	France 1,431; West Germany 176.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	4,485	3,979	--	France 1,972; Italy 1,244.
Sodium carbonate, natural and manufactured	3,949	5,272	--	France 2,546; East Germany 1,859.
Sodium hydroxide	11,227	9,979	2	West Germany 3,398; France 3,034.
Sodium sulfate, natural and manufactured	14,877	16,886	--	West Germany 9,702; Austria 6,877; France 287.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	114,750	106,376	--	West Germany 53,213; Italy 20,191.
Worked	104,380	93,762	--	Italy 71,258; Austria 10,050.
Dolomite, chiefly refractory-grade	29,257	26,781	--	Italy 22,064; France 3,080.
Gravel and crushed rock thousand tons	5,024	5,116	(1)	France 2,790; West Germany 1,430.
Limestone other than dimension	32,822	16,342	--	Italy 10,354; France 5,842.
Quartz and quartzite	37,108	37,223	201	Italy 29,705; West Germany 6,072.
Sand other than metal-bearing thousand tons	1,193	1,202	(1)	France 285; West Germany 285.
Sulfur:				
Elemental:				
Crude including native and byproduct	48,188	29,735	--	West Germany 28,666; France 1,006.
Colloidal, precipitated, sublimed	231	189	--	France 161; West Germany 28.
Dioxide	360	318	(1)	Austria 39; Italy 4.
Sulfuric acid	2,746	2,318	--	West Germany 2,051; Austria 197.
Talc, steatite, soapstone, pyrophyllite	12,951	13,255	6	Austria 7,368; Italy 2,551.
Other:				
Crude	r83,865	76,216	156	West Germany 40,266; Netherlands 7,831.
Slag and dross, not metal-bearing	24,123	31,752	--	West Germany 19,979; France 11,255.
Oxides and hydroxides of barium, magnesium, strontium	168	210	8	France 92; West Germany 55.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	23,438	35,244	--	West Germany 18,867; Hungary 5,174.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,039	1,105	118	Trinidad 934; West Germany 53.
Carbon:				
Carbon black	4,550	4,008	97	West Germany 2,733; France 524.
Gas carbon	110	210	--	All from West Germany.
Coal:				
Anthracite and bituminous	r573,437	862,858	448,371	Republic of South Africa 148,371; West Germany 135,091.
Briquets of anthracite and bituminous coal	r17,277	17,253	--	West Germany 15,628; Belgium-Luxembourg 950.
Lignite including briquets	r48,526	43,101	--	West Germany 41,812; East Germany 1,283.
Coke and semicoke	127,036	102,162	--	West Germany 57,848; France 26,268.
Gas, natural million cubic feet	746	706	NA	NA.
Gas, manufactured kilograms	150	19	--	NA.
Hydrogen, helium, rare gases	4,585	5,218	52	West Germany 4,495; Italy 471.
Peat including briquets and litter	86,459	68,079	--	West Germany 50,270; U.S.S.R. 16,642.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	28,740	23,340	--	United Arab Emirates 8,129; Saudi Arabia 3,476.

See footnotes at end of table.

Table 3.—Switzerland: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	10,140	11,095	(1)	Netherlands 6,651; West Germany 4,422.
Gasoline: Motor do	r17,635	17,902	(1)	Belgium-Luxembourg 5,635; France 3,169.
Mineral jelly and wax do	107	100	1	West Germany 65; France 14.
Kerosine and jet fuel do	505	435	(1)	Italy 189; Belgium-Luxembourg 88.
Distillate fuel oil do	r42,831	36,596	--	U.S.S.R. 17,678; France 4,905.
Lubricants do	r645	593	14	West Germany 151; Belgium-Luxembourg 110.
Residual fuel oil do	r3,140	2,943	67	West Germany 987; France 751.
Bitumen and other residues do	r1,672	1,607	--	France 837; West Germany 504.
Bituminous mixtures do	69	65	1	West Germany 39.
Petroleum coke do	642	521	311	West Germany 197.
Tars and other crude chemicals derived from coal, gas, and petroleum	29,301	35,675	57	France 10,965; Czechoslovakia 8,900.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include platinum-group metals.
[3]May include some manufactured.

COMMODITY REVIEW

METALS

Aluminum.—In spite of the world recession, Swiss Aluminium Ltd. (Alusuisse) completed plans to modernize and expand its Valais works during 1982. Investment of about $115 billion dollars in smelters at Chippis and Steg and the rolling extrusion plant at Siders should transform them into the most modern facilities for production and processing of aluminum in Europe. In 1982, the program to reduce smelter pollution was completed. At Chippis, fumes from the cells were collected directly from a hole in the crust kept open by a crust-breaker; at Steg the cells were completely hooded. At both, a dry absorption unit cleaned fumes from the furnaces. A new 3,500-ton indirect press was the major improvement in the extrusion plant. The press requires about 70% less pressure than indirect extrusion, and power savings range from 20% to 30%.

MINERAL FUELS

Petroleum and Natural Gas.—Switzerland started on the way to becoming a producer of natural gas; a gas find by a subsidiary of Swiss Petrol S.A. in well Entebuch-1 at Finsterwald would be the first indigenous supply of hydrocarbon in the country. It was tested and flowed at an indicated rate of 9 million cubic feet per day. Later in the year, a decision was made to tie the small Finsterwald gasfield to the international transit gasline and start production sometime in 1984 or 1985. Swiss Petrol also continued its 8-year exploration program with Brigitta Elwerater A.G. (Deutsche Shell and Esso A.G.) as operator.

[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Swiss francs (SF) to U.S. dollars at the average rate of SF2.2=US$1.00.

The Mineral Industry of Taiwan

By E. Chin[1]

Taiwan's gross national product (GNP) for 1982 was estimated at $46.7 billion[2] at current market prices and at $29.7 billion at 1976 prices, compared with $45.9 billion and $28.6 billion, respectively, for 1981. The economic growth rate of 4% in 1982 sharply contrasts to Taiwan's historical average growth rate of 9% per year over the past three decades. The downturn in the economy's growth rate resulted from weaker overseas sales of Taiwan goods, inasmuch as exports represented generally about one-half of Taiwan's GNP. To combat the slowdown in growth, the Government relied on easing monetary policy and a moderate devaluation of its currency. Interest rates were lowered eight times between August 1981 and September 1982 with the prime rate falling from 15.25% to 9.75%. The ban on construction loans in effect since 1974 was lifted in 1982. Following a devaluation of the Taiwan dollar in August 1981, the currency was allowed to depreciate by 7% as of November 15, 1982. Because of sluggish export orders, the manufacturing sector was plagued with about 25% excess capacity. Fiscal policies adopted to stimulate the economy included lowering custom duties on selected machinery imports and improving tax incentives in capital- and technology-intensive industries. Also, some public works projects were moved up to start after July 1, 1982.[3]

Except for construction raw materials, Taiwan is dependent on foreign raw materials; i.e., minerals and fuels. In 1982, the mineral processing sector outweighed the domestic mining sector by 21 to 1 in output values compared with 20 to 1 in 1981 and with 13 to 1 in 1971. The value of domestic mine output was down 12% in 1982, reversing the annual growth during 1976-81. By sector, the value of domestic output of mineral fuels was down 10% to $413 million, and metallic ores was down 17% to $66 million. The total value of domestic mining in 1982 represents only about 1% of GNP.

Monthly employment in the mining and quarry sector averaged 50,250 in 1982 compared with 51,900 in 1981. Monthly earnings in the mining sector in 1982 were $394 compared with $310 for manufacturing, $465 for utilities, and $260 for construction. Monthly average working hours in the mining sector were 186 in 1982, down from 190 in 1981.

In April 1982, the Legislative Yuan revised the environmental air pollution law. Under the new amendments, offenders will face daily fines of $1,600 to $7,900 for pollution. Moreover, the change in the law provides for the suspension of operation of polluting facilities in the event that fines were not sufficient to force air quality improvement or the installation of pollution controls. A maximum emission standard for air pollutants was to be enforced in certain areas.

On December 23, 1982, the Executive Yuan approved the economic development plan for 1983, which targets an economic growth rate of 5.5%. Agriculture was to grow by 20%; manufacturing, 5.4%; and services, 5.8%. The current 4-year economic plan (1982-85) stresses short-term economic recovery and long-term improvement of Taiwan's economic structure.[4] During 1983, inflation was not to exceed 5% for commodity prices. The target growth for exports was set at 4.1%, and for imports, 5.4%. GNP was projected at $48.1 billion in 1983, and per capita income was to reach $2,700. The output of key industries—mainly basic metals, machinery, and electronics—was ex-

pected to account for 33% of the 1983 gross industrial product. To attain the overall 5.5% targeted increase in GNP, gross fixed capital formation in the private sector was set at a 10.6% growth rate.

PRODUCTION

Domestic mine production of minerals in Taiwan is of little consequence by world standards. Because of high world prices, the value of mineral fuels output dominates Taiwan's small mining industry. There are small quantities of crude petroleum and natural gas produced from indigenous wells. After oil and natural gas, coal was the second most important mineral mined. However, output of coal has decreased annually since 1967. The principal significance of domestic mineral fuels production was as a very small supplement to Taiwan's imported fuel requirements.

The metallic minerals mined included only small quantities of copper and iron sands. In terms of tonnage, the largest nonmetallic output is of carbonate minerals—limestone, marble, and dolomite, in that order. Other nonmetallic values produced included asbestos, clays, feldspar, gem stones, gypsum, mica, pyrite, salt, serpentine, sulfur, and talc.

The overall value of production by the mining industry was distributed as follows, in millions: crude petroleum and natural gas, $244; coal, $170; metals, $126; and miscellaneous nonmetallic mining and quarrying, $66. All of the metal mining and production of crude petroleum and natural gas was from Government-owned operations. The private sector, however, accounts for about 98% of the annual production of coal. About 85% of the output of miscellaneous mining and quarrying is by the private sector.

The bulk of Taiwan's industrial output of mineral-derived products is from imported materials. Domestic production of finished articles and semimanufactures is primarily for export markets. Metal production includes ingots and manufactures of iron and steel, aluminum, copper, gold, and silver. The value added by secondary and tertiary industries related to minerals and metals was as follows, in millions: petroleum and coal products, $4,551; chemicals and chemical products, $4,548; and nonmetallic mineral products, $2,742. In 1982, the total value of mining and manufacturing in Taiwan was estimated to be about $44 billion comprised as follows, in millions: manufactures of the mineral processing sector, $13,093; mining, $606; and all other manufacturing, $31,301.[5]

Table 1.—Taiwan: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Alumina, gross weight	51,000	r59,000	r80,000	19,000	e20,000
Metal, primary	50,512	56,218	63,549	30,532	10,120
Copper:					
Mine output, metal content[e]	r14,500	r15,300	r19,500	19,000	19,000
Metal, refined	14,353	15,305	19,495	53,230	47,377
Gold, primary troy ounces	13,407	14,243	13,278	56,693	71,768
Iron and steel: Metal:					
Pig iron thousand tons	1,417	1,760	r1,724	1,611	2,695
Ferroalloys: Ferrosilicon	29,785	37,500	35,326	39,585	46,230
Steel, crude thousand tons	r3,426	r3,196	r3,417	3,143	4,078
Lead, smelter, secondary	14,000	20,000	16,800	24,000	24,000
Silver, primary troy ounces	75,316	85,383	95,073	214,875	504,077
NONMETALS					
Asbestos	2,031	2,957	683	2,317	2,392
Cement, hydraulic thousand tons	11,461	11,897	14,062	14,342	13,432
Clays:					
Fire clay	24,889	48,539	48,048	34,879	35,577
Kaolin	66,180	r84,991	79,802	90,836	87,532
Feldspar	15,757	24,403	25,149	17,215	10,305
Gypsum:					
Precipitated	1,526	2,535	3,364	1,985	1,320
Other	1,859	--	4,706	4,054	725
Lime thousand tons	r171	177	199	143	109

See footnotes at end of table.

Table 1.—Taiwan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Mica	1,388	r1,148	338	85	44
Nitrogen: N content of ammonia	438,605	390,923	414,350	406,097	317,647
Pyrite, gross weight	767	536	150	20	19
Salt, marine thousand tons	341	366	722	351	262
Sodium compounds, n.e.s.:					
Caustic soda	r369,762	r429,654	r410,800	372,996	354,736
Sodium carbonate (soda ash)	76,992	80,715	92,540	72,064	59,220
Stone:					
Dolomite thousand tons	417	530	489	359	261
Limestone do.	12,857	13,126	12,822	13,221	11,378
Marble thousand cubic meters	1,641	1,976	2,839	3,269	3,155
Serpentine	35,580	50,915	102,927	118,175	119,295
Sulfur:					
S content of pyrite	r410	r286	r80	11	10
Byproduct, all sources	9,506	8,946	8,099	9,849	20,080
Total	r9,916	r9,232	r8,179	9,860	20,090
Talc	9,946	11,194	9,911	24,774	30,661
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	9,501	12,983	15,070	23,406	21,313
Coal, bituminous thousand tons	2,884	2,720	2,574	2,446	2,384
Coke do.	236	240	227	219	159
Gas, natural:[2]					
Gross[e] million cubic feet	r69,000	r68,000	r69,000	59,000	48,000
Marketed do.	r64,999	r60,759	r60,329	53,042	43,526
Petroleum:					
Crude thousand 42-gallon barrels	1,552	1,451	1,330	1,150	874
Refinery products:					
Gasoline do.	11,383	12,560	13,086	13,008	14,154
Kerosine do.	--	79	--	--	98
Distillate fuel oil do.	20,533	20,643	22,418	20,769	19,792
Residual fuel oil do.	58,264	57,525	63,988	60,286	57,133
Lubricants do.	917	945	857	802	702
Asphalt do.	2,420	1,715	1,749	1,813	2,271
Other[3] do.	7,905	5,304	2,595	1,562	1,442
Refinery fuel, losses and not reported[e 4] do.	7,965	7,760	8,225	24,201	25,000
Total do.	109,387	106,531	112,918	122,441	120,592

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through June 1, 1983.

[2]Largely processed into natural gas liquids.

[3]Naphtha, solvent oil, and base oil.

[4]Includes liquefied petroleum gas and jet fuel among "not reported."

TRADE

In 1982, Taiwan's two-way trade totaled $41.1 billion, down $2.7 billion from that in 1981. Exports decreased 2% to $22.2 billion in 1982, while imports decreased 11% to $18.9 billion.

The United States and Japan continued to be Taiwan's major trade partners in 1982, comprising 47% of Taiwan's total value of two-way trade. The value of exports to the United States totaled $8.7 billion in 1982, followed by Japan, $2.4 billion; Hong Kong, $1.6 billion; the Federal Republic of Germany, $0.8 billion; Saudi Arabia, $0.7 billion; and Australia, $0.6 billion. Japan was Taiwan's major supplier of imports, providing $4.8 billion. Receipts from the United States were $4.6 billion; Saudi Arabia, $1.9 billion; Kuwait, $1.3 billion; the Federal Republic of Germany, $0.8 billion; and Australia, $0.6 billion.[6]

Industrial goods, including processed agricultural products, continued to dominate Taiwan's commodity exports. The largest export category was textiles, accounting for about 20% of the total value of exports, followed by electronic products, about 15%. Other major exports by value, in declining order of magnitude, were electrical machinery and appliances, metal products, plastic shoes, wood products, and mechanical and transportation equipment. Crude oil has been the leading commodity import by value since 1977, displacing machinery, which had been the major import prior to the first oil crises in the early 1970's. The other major import categories in 1982 were electrical machinery and appliances, iron and steel, and transportation equipment.

Table 2.—Taiwan: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	3,740	1,365	--	Indonesia 1,263.
Metal including alloys, all forms	7,456	6,643	115	Hong Kong 3,075; Indonesia 1,387; Japan 1,250.
Columbium and tantalum: Metals including alloys, all forms	--	455	450	Austria 2.
Copper:				
Matte and speiss including cement copper	--	14	--	All to Hong Kong.
Sulfate	195	34	--	Indonesia 20; Singapore 12.
Metal including alloys:				
Scrap	5,279	2,860	--	Japan 2,742.
Unwrought	273	218	2	Japan 128; India 65.
Semimanufactures	9,189	2,641	291	Hong Kong 1,053; Singapore 564.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	607,070	32	--	All to Philippines.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	--	2	(1)	Mainly to Sweden.
Metal:				
Scrap	12,863	128,251	--	Thailand 45,944; Japan 40,380; Republic of Korea 24,113.
Pig iron, cast iron, related materials	989	887	579	Australia 50; Canada 46; Hong Kong 44.
Ferroalloys	23,282	8,572	101	Japan 5,120; Indonesia 2,032.
Steel, primary forms	120,247	204,568	44	Indonesia 112,743; Philippines 45,612; Malaysia 17,966.
Semimanufactures:				
Bars, rods, angles, shapes, sections	289,819	551,282	5,521	Hong Kong 217,663; Saudi Arabia 130,746; Republic of Korea 33,398.
Universals, plates, sheets	161,175	209,784	6,336	Japan 66,102; Singapore 54,740; Hong Kong 27,205.
Hoop and strip	3,416	1,954	13	Hong Kong 641; Indonesia 440.
Rails and accessories	3,203	1,465	5	Thailand 437; Malaysia 400; Japan 200.
Wire	10,640	7,061	286	Hong Kong 2,352; Indonesia 1,434; Saudi Arabia 699.
Tubes, pipes, fittings	179,754	215,424	117,167	Saudi Arabia 32,001; Hong Kong 13,641; United Arab Emirates 5,059.
Castings and forgings, rough	7,555	7,600	5,032	Indonesia 634; Japan 361; Philippines 333.
Lead: Metal including alloys, all forms	11,895	14,361	--	Republic of Korea 6,222; Thailand 3,085; Japan 2,606.
Magnesium: Metal including alloys, all forms	5	530	457	Israel 55.
Manganese: Oxides	(2)	4	--	Philippines 3.
Mercury 76-pound flasks	--	5	--	All to Indonesia.
Metalloids:				
Phosphorus kilograms	854	2	--	All to Singapore.
Silicon	20	20	--	All to Malaysia.
Molybdenum: Metal including alloys, all forms	--	5	--	Ecuador 2; Japan 2.
Nickel:				
Matte and speiss	263	--		
Metal including alloys:				
Scrap	572	947	1	Japan 915.
Unwrought and semimanufactures	83	81	(2)	India 36; Japan 19; Saudi Arabia 18.
Silver:				
Ore and concentrate[3] value	--	$31,354	--	All to Japan.
Waste and sweepings thousand troy ounces	22	1,167	52	Japan 589; Singapore 387.
Metal including alloys, unwrought and partly wrought troy ounces	1,061	2,476	--	Hong Kong 1,511; Malaysia 965.
Tin: Metal including alloys, all forms	145	178	29	Hong Kong 114.
Titanium: Oxides	243	107	--	Republic of Korea 36; Indonesia 25; Nigeria 21.
Tungsten: Metal including alloys, all forms	8	6	1	Japan 3.
Zinc:				
Oxides	1,957	1,747	--	Japan 1,255; Philippines 375; Thailand 88.
Blue powder	13	121	--	Japan 73; Hong Kong 48.
Metal including alloys, all forms	r480	757	57	Japan 552; Indonesia 108.

See footnotes at end of table.

Table 2.—Taiwan: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Other:				
Oxides and hydroxides	25	57	(2)	Philippines 35; Japan 17.
Ashes and residues	761	2,313	--	Japan 2,293.
Pyrophoric alloys kilograms	17	--		
Base metals including alloys, all forms	98	161	13	Hong Kong 50; Indonesia 45.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	19	26	--	Indonesia 19; Hong Kong 6.
Artificial: Corundum	26	132	--	Japan 106; Philippines 17.
Dust and powder of precious and semiprecious stones including diamond kilograms	1,098	--		
Grinding and polishing wheels and stones	2,148	2,350	900	Thailand 492; Singapore 209; Indonesia 185.
Asbestos, crude	--	37	--	Hong Kong 32.
Boron materials: Oxides and acids	49	76	--	Hong Kong 68.
Cement thousand tons	598	1,568	2	Hong Kong 712; Singapore 383; Malaysia 195.
Clays and clay products:				
Crude:				
Bentonite	49	65	--	Thailand 50; Hong Kong 15.
Fire clay	--	10	--	All to Philippines.
Unspecified	178	212	--	Indonesia 121; Philippines 83.
Products:				
Nonrefractory	23,859	30,194	200	Hong Kong 13,913; Singapore 7,327; Saudi Arabia 3,214.
Refractory including nonclay brick	7,488	5,548	31	Philippines 2,047; Indonesia 1,261.
Cryolite and chiolite	--	1	--	All to Thailand.
Diamond:				
Natural:				
Gem, not set or strung thousand carats	345	275	--	France 170; Japan 45.
Industrial do	3,915	780	--	Ecuador 545; West Germany 225.
Synthetic: Gem, not set or strung do	12,410	70,005	1,320	Spain 48,670; Japan 19,055.
Diatomite and other infusorial earth	184	112	--	Japan 92.
Feldspar, fluorspar, related materials	4	20	--	All to Singapore.
Fertilizer materials: Manufactured:				
Ammonia	144	275	--	Thailand 243; Hong Kong 31.
Nitrogenous	(4)	600	--	All to Indonesia.
Potassic	1,000	5,589	--	Republic of Korea 3,676; Brunei 1,013; Japan 800.
Unspecified and mixed	373	256	--	Hong Kong 149; Republic of Korea 44; Philippines 41.
Graphite, natural	505	502	--	Japan 309; Netherlands 153.
Gypsum and plaster	5 1,582	1,049	--	Indonesia 1,029.
Halogens:				
Chlorine	51	50	--	All to Kuwait.
Iodine	--	1	--	Mainly to Republic of Korea.
Lime	5,247	1,868	--	Hong Kong 1,110; Nigeria 620.
Magnesium compounds: Magnesite	--	54	--	All to Indonesia.
Mica, all forms	119	138	(2)	New Zealand 68; Australia 34; United Kingdom 34.
Phosphates, crude	--	16	--	Mainly to Japan.
Pigments, mineral: Iron oxides and hydroxides, processed	53	106	--	Singapore 67; Netherlands 18; Thailand 10.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material kilograms	9,666	36,019	11,687	Italy 6,645; Hong Kong 4,906; Japan 2,348.
Meerschaum, amber, jet do	113	22	1	Japan 19.
Synthetic do	73,611	16,746	9,948	Japan 787; Republic of South Africa 767; Saudi Arabia 506.
Salt and brine	13,590	3,065	--	Hong Kong 3,050.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides kilograms	--	303	--	All to United Arab Emirates.
Sodium carbonate, natural and manufactured	--	12	--	Saudi Arabia 10.
Sodium hydroxide	20,917	802	--	All to Indonesia.

See footnotes at end of table.

Table 2.—Taiwan: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	4,367	7,358	121	Japan 3,217; Saudi Arabia 2,838.
Worked	25,972	26,553	2,848	Saudi Arabia 9,512; Japan 7,136.
Dolomite, chiefly refractory-grade	93,390	62,092	--	Japan 59,200.
Gravel and crushed rock	315,349	365,033	--	Japan 364,830.
Limestone other than dimension	2,416	917	--	Hong Kong 555; Nigeria 220; Malaysia 100.
Sand other than metal-bearing	180,953	237,732	--	Japan 237,315.
Sulfur:				
Elemental:				
Crude including native and by-product	1,310	817	--	Indonesia 280; Thailand 220; Philippines 192.
Colloidal, precipitated, sublimed	631	444	--	Philippines 250; Indonesia 100; Malaysia 80.
Sulfuric acid	2,046	800	--	Hong Kong 424; Saudi Arabia 134; Australia 104.
Talc, steatite, soapstone, pyrophyllite	1,043	1,706	--	Thailand 629; Indonesia 519; Malaysia 413.
Other:				
Crude	654	2,207	75	Indonesia 660; Hong Kong 451; Thailand 444; Japan 424.
Slag and dross, not metal-bearing	1,573	406	--	Republic of South Africa 163; Indonesia 100; Japan 91.
Oxides and hydroxides of barium, magnesium, strontium	2	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	338	468	--	Thailand 142; Hong Kong 141; Nigeria 85.
MINERAL FUELS AND RELATED MATERIALS				
Carbon:				
Carbon black	489	722	--	Thailand 397; Indonesia 190; Republic of Korea 120.
Gas carbon	7	5	--	All to Hong Kong.
Coal: All grades including briquets	210	30	--	All to Philippines.
Coke and semicoke	10,466	10,281	--	Indonesia 6,380; Malaysia 1,185; Thailand 1,100.
Hydrogen, helium, rare gases kilograms	127,360	40,325	--	Philippines 40,320.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	--	(2)	--	All to Singapore.
Refinery products:				
Liquefied petroleum gas do	178	91	--	All to Hong Kong.
Gasoline do	62	17	--	All to Thailand.
Mineral jelly and wax do	--	(2)	--	Mainly to Nigeria.
Kerosine and jet fuel do	1,028	2,736	211	Philippines 1,036; Japan 721; India 408.
Distillate fuel oil do	5,037	6,394	--	Japan 1,575; Hong Kong 678; Republic of Korea 585.
Lubricants do	610	464	2	India 304; Republic of Korea 134.
Nonlubricating oils do	11	(2)	--	Mainly to Republic of Korea.
Bitumen and other residues do	--	3	--	Indonesia 2.
Petroleum coke do	--	1	--	All to Singapore.
Tars and other crude chemicals derived from coal, gas, and petroleum	40,441	24,551	--	Japan 11,465; Republic of Korea 8,009; Indonesia 4,490.

[r] Revised.
[1] Unreported quantity valued at $5,833.
[2] Less than 1/2 unit.
[3] May include platinum-group metals.
[4] Unreported quantity valued at $2,746.
[5] Excludes unreported quantity valued at $444.

Table 3.—Taiwan: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Rare-earth metals	310	175	12	Japan 126; West Germany 37.
Aluminum:				
Ore and concentrate	260,438	106,754	--	All from Malaysia.
Oxides and hydroxides	59,026	39,323	234	Australia 33,279; Japan 4,317; India 644.
Metal including alloys:				
Scrap	19,255	16,847	12,852	Canada 1,240; Australia 1,102; Japan 531.
Unwrought	58,320	47,752	12,300	Bahrain 11,590; Ghana 5,823; Canada 3,604.
Semimanufactures	25,513	9,694	1,438	Japan 5,690; Australia 691; Republic of Korea 573.
Beryllium: Metal including alloys, all forms kilograms	1,653	12,961	12,961	
Chromium:				
Ore and concentrate	6,363	1,270	--	Republic of South Africa 803; Philippines 449.
Oxides and hydroxides	2,410	1,248	265	Japan 549; West Germany 380; Italy 52.
Cobalt: Oxides and hydroxides	23	25	--	Belgium 12; Canada 7; Japan 4.
Columbium and tantalum: Metals including alloys, all forms, tantalum kilograms	79	131	--	Australia 100; West Germany 31.
Copper:				
Ore and concentrate	131,315	215,963	9,131	Philippines 84,409; Canada 50,095; Chile 35,615.
Matte and speiss including cement copper	14	21	16	Hong Kong 4.
Sulfate	227	300	42	Japan 252.
Metal including alloys:				
Scrap	35,072	32,984	27,003	Hong Kong 1,754; Japan 1,577.
Unwrought	66,185	40,157	168	Japan 16,777; Chile 14,328; Peru 5,508.
Semimanufactures	31,989	36,546	1,894	Japan 31,333.
Gold:				
Bullion troy ounces	376,504	444,676	--	All from Switzerland.
Metal including alloys, unwrought and partly wrought do.	340,122	721,976	387,512	Japan 334,239.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	2,844	2,413	--	Australia 1,433; Brazil 778; Republic of South Africa 115.
Pyrite, roasted	49,142	55,079	--	All from Philippines.
Metal:				
Scrap thousand tons	1,232	881	337	Hong Kong 288; Australia 134; United Kingdom 60.
Pig iron, cast iron, related materials	r164,543	188,129	517	Brazil 103,612; Australia 63,208.
Ferroalloys	2,926	3,424	132	Japan 1,949; Republic of South Africa 733.
Steel, primary forms	266,521	71,727	529	Republic of Korea 45,358; Republic of South Africa 12,600.
Semimanufactures:				
Bars, rods, angles, shapes, sections	301,500	282,804	824	Japan 260,205.
Universals, plates, sheets thousand tons	1,625	1,732	42	Japan 1,069; Republic of Korea 210.
Hoop and strip	21,749	25,471	1,604	Japan 20,193; Australia 1,764.
Rails and accessories	13,814	12,736	1,263	Republic of Korea 8,697; Japan 2,506.
Wire	10,987	10,631	598	Japan 7,096; Republic of Korea 1,687.
Tubes, pipes, fittings	54,828	56,030	1,250	Japan 52,473.
Castings and forgings, rough	1,896	2,592	242	Japan 2,335.
Lead:				
Oxides	3,939	2,905	2	Australia 2,019; Mexico 754.
Metal including alloys:				
Scrap	44,690	38,796	14,044	Kuwait 9,575; Australia 3,632; Singapore 2,384.
Unwrought	10,776	7,418	125	Australia 4,240; Japan 1,366; Mexico 1,094.
Semimanufactures	240	136	12	Japan 101.
Magnesium: Metal including alloys, all forms	67	267	137	Norway 80; France 37.
Manganese:				
Ore and concentrate	142,975	62,742	(1)	Gabon 31,244; Republic of South Africa 15,845; Japan 10,676.
Oxides	2,057	1,408	(1)	Japan 736; Singapore 473; Belgium 177.
Metal including alloys, all forms	77	21	16	Republic of South Africa 5.

See footnotes at end of table.

Table 3.—Taiwan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Mercury 76-pound flasks	373	424	22	Japan 192; Belgium 92; Mexico 60.
Metalloids:				
Arsenic:				
Ore and concentrate	4	2	--	Mainly from Hong Kong.
Oxides and acids	190	220	--	France 144; Belgium 76.
Phosphorus	256	544	341	Canada 122; West Germany 33.
Selenium kilograms	5,971	6,067	--	Japan 4,665; West Germany 1,402.
Silicon	1,036	1,055	106	West Germany 497; Norway 174; Canada 148.
Unspecified kilograms	4,700	9,534	42	Sweden 4,800; Netherlands 4,652.
Molybdenum: Metal including alloys, all forms	44	50	45	Japan 4.
Nickel:				
Matte and speiss	--	18	--	All from Canada.
Metal including alloys:				
Scrap	11	79	1	Singapore 52; Malaysia 15.
Unwrought	2,230	2,479	6	Canada 1,748; Norway 290; Japan 149.
Semimanufactures	468	170	20	West Germany 40; Japan 30; Australia 27.
Platinum-group metals:				
Ore and concentrate value	$28,377	$34,310	--	All from United Kingdom.
Metal including alloys, unwrought and partly wrought thousand troy ounces	113	127	1	Japan 109.
Silver:				
Waste and sweepings[2] troy ounces	579	3,762	--	West Germany 1,897; Hong Kong 1,222.
Metal including alloys, unwrought and partly wrought thousand troy ounces	780	795	37	Japan 504; West Germany 139; Hong Kong 65.
Tin:				
Ore and concentrate	5	--	--	
Oxides	51	16	--	West Germany 8; Canada 5; Netherlands 2.
Metal including alloys, all forms	1,498	1,559	61	Malaysia 865; Hong Kong 391; Singapore 158.
Titanium: Oxides	14,515	14,627	910	Japan 7,440; Australia 2,334; West Germany 2,286.
Tungsten: Metal including alloys, all forms	55	35	1	Japan 32.
Uranium and/or thorium: Oxides and other compounds	93	72	68	Japan 3.
Zinc:				
Oxides	129	224	29	West Germany 110; Japan 78.
Blue powder	67	173	1	Japan 137; Norway 35.
Metal including alloys:				
Scrap	28,823	33,397	27,874	Canada 2,552; Japan 1,460; Singapore 342.
Unwrought	38,382	43,394	(1)	Australia 25,690; Japan 8,749; Canada 4,431.
Semimanufactures	663	735	29	Japan 521; West Germany 175.
Other:				
Ores and concentrates:				
Of molybdenum, tantalum, titanium, vanadium, zirconium	17,761	17,890	(1)	Malaysia 10,534; Australia 7,206.
Of base metals, n.e.s	66	146	123	Japan 17.
Oxides and hydroxides	984	1,313	91	Japan 517; West Germany 277; France 155.
Ashes and residues	14,944	14,193	5,314	Australia 4,608; Singapore 948; Hong Kong 725.
Pyrophoric alloys kilograms	3,902	--		
Base metals including alloys, all forms	435	537	46	Japan 338; Republic of South Africa 44; United Kingdom 35.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,848	2,550	742	Japan 1,596; Italy 111.
Artificial: Corundum	5,716	5,521	804	Japan 3,343; India 915; Brazil 350.
Dust and powder of precious and semiprecious stones, including diamond kilograms	862	373	161	Japan 103; Australia 85; United Kingdom 24.
Grinding and polishing wheels and stones	710	891	111	Italy 372; Japan 362.

See footnotes at end of table.

Table 3.—Taiwan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Asbestos, crude	31,247	30,121	1,733	Canada 15,924; Republic of South Africa 11,852.
Barite and witherite	7,605	3,035	--	All from Thailand.
Boron materials:				
Crude natural borates	1,238	1,435	--	Japan 949; Netherlands 486.
Oxides and acids	7,736	7,584	7,429	United Kingdom 85.
Cement	9,690	14,078	7	Japan 12,930.
Chalk	--	70	--	All from Japan.
Clays and clay products:				
Crude:				
Bentonite	6,435	7,237	6,630	Japan 378; Republic of South Africa 126.
Fire clay	2,274	1,592	191	Japan 1,299; West Germany 85.
Kaolin	66,753	54,261	31,170	Republic of Korea 9,100; Hong Kong 5,525; Indonesia 3,718.
Unspecified	156,129	110,852	1,739	Hong Kong 45,948; Japan 39,858; India 18,530.
Products:				
Nonrefractory	20,393	13,339	50	Italy 9,441; West Germany 1,879; Japan 1,012.
Refractory including nonclay brick	24,982	23,032	2,087	Japan 10,523; West Germany 7,989.
Cryolite and chiolite	5	5	--	Austria 4.
Diamond:				
Natural:				
Gem, not set or strung thousand carats	--	5,645	5	India 5,000; Hong Kong 550.
Industrial do	7,270	1,460	1,010	Japan 385.
Synthetic:				
Gem, not set or strung do	30	70	10	Japan 60.
Industrial do	540	9,850	5	Philippines 8,915; United Kingdom 730.
Diatomite and other infusorial earth	2,909	3,733	2,576	Japan 1,117.
Feldspar, fluorspar, related materials	54,262	49,606	581	Republic of Korea 15,008; Japan 13,285; Thailand 11,837.
Fertilizer materials: Manufactured:				
Ammonia	22	15	12	Japan 3.
Nitrogenous	812	126,201	57,324	Republic of Korea 55,490; Japan 13,386.
Phosphatic	(1)	1	1	
Potassic	224,387	247,244	31,436	Canada 133,495; Israel 38,036; Japan 14,079.
Unspecified and mixed	13,114	11,593	10,849	Japan 607.
Graphite, natural	15,696	10,440	(1)	Republic of Korea 7,820; India 1,464; Japan 674.
Gypsum and plaster	227,277	360,966	297	Japan 185,678; Australia 103,496; Republic of Korea 41,800.
Halogens:				
Bromine kilograms	153	127	--	Japan 124.
Chlorine do	932	1,192	192	West Germany 1,000.
Iodine	8	6	(1)	Mainly from Japan.
Unspecified kilograms	--	166	166	
Lime	3	31	--	All from Japan.
Magnesium compounds: Magnesite	7,685	17,397	25	Japan 9,850; India 5,400.
Mica:				
Crude including splittings and waste	337	292	(1)	Japan 247; India 34.
Worked including agglomerated splittings	102	143	3	Japan 119.
Phosphates, crude	297,797	314,016	41,012	Jordan 226,660; Israel 45,944.
Pigments, mineral:				
Natural, crude	26	58	--	Mainly from Japan.
Iron oxides and hydroxides, processed	7,859	9,242	6	Japan 7,009; West Germany 1,149; Netherlands 460.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material	1,660	1,787	4	Brazil 681; Canada 479; Republic of South Africa 400.
Meerschaum, amber, jet kilograms	885	27,973	--	Japan 26,100.
Synthetic do	12,734	24,226	2,494	Italy 12,150; Republic of South Africa 3,000; West Germany 1,955.
Salt and brine	563,710	481,271	2	Australia 481,233.

See footnotes at end of table.

Table 3.—Taiwan: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,801	1,584	(1)	Japan 1,253; France 182; Italy 90.
Sodium carbonate, natural and manufactured	24,135	17,772	9,146	Japan 6,917; France 1,707.
Sodium hydroxide	57	48	36	Japan 10.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	20,997	25,789	34	India 10,127; Italy 6,026; Republic of Korea 2,680.
Worked	728	285	22	Japan 237.
Dolomite, chiefly refractory-grade	1,485	971	(1)	Mainly from Japan.
Gravel and crushed rock	3,366	3,362	(1)	France 2,862; Republic of Korea 270.
Limestone other than dimension	680	4,444	--	All from Japan.
Quartz and quartzite	605	516	52	Belgium 286; Sweden 83; Japan 72.
Sand other than metal-bearing	2,813	10,519	382	Australia 6,669; Indonesia 2,000; Japan 1,129.
Sulfur:				
Elemental:				
Crude including native and by-product	122,737	75,887	--	Canada 72,775; Japan 3,102.
Colloidal, precipitated, sublimed	250,497	264,015	356	Canada 208,321; Japan 54,790.
Dioxide	46	22	(1)	Mainly from Japan.
Sulfuric acid	14,597	43,311	21	Japan 41,819; Republic of Korea 1,460.
Talc, steatite, soapstone, pyrophyllite	4,775	4,694	987	Republic of Korea 2,210; India 550; Japan 508.
Other:				
Crude	158,744	101,187	48	Republic of Korea 73,111; Japan 16,456; Republic of South Africa 5,678.
Slag and dross, not metal-bearing	34,618	12,083	71	Japan 11,833.
Oxides and hydroxides of barium, magnesium, strontium	11,420	917	92	Japan 775; West Germany 49.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	2,102	3,630	114	Japan 3,176.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	106	101	55	United Kingdom 34; Japan 12.
Carbon:				
Carbon black	15,923	9,677	3,697	Australia 5,139; Japan 496.
Gas carbon	5	--		
Coal: All grades including briquets thousand tons	4,069	5,187	2,107	Australia 1,666; Republic of South Africa 1,000.
Coke and semicoke	98,785	70,699	--	All from Japan.
Hydrogen, helium, rare gases	632	945	17	Japan 895.
Peat including briquets and litter	40	60	--	All from Finland.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	132,371	125,808	--	Saudi Arabia 55,235; Kuwait 51,643; Ecuador 4,651.
Refinery products:				
Liquefied petroleum gas do	1,487	2,778	--	Saudi Arabia 1,584; Australia 929; United Arab Emirates 232.
Gasoline do	NA	(1)	--	All from West Germany.
Mineral jelly and wax do	88	77	7	Japan 44; Indonesia 15.
Kerosine and jet fuel do	--	(1)	--	All from Japan.
Distillate fuel oil do	18,668	15,641	4,152	Kuwait 8,526; Singapore 2,217.
Lubricants do	584	449	163	Japan 241.
Nonlubricating oils do	1,558	48	21	Japan 25.
Bitumen and other residues do	1	34	24	Republic of Korea 10.
Bituminous mixtures do	1	1	(1)	Mainly from Japan.
Petroleum coke do	238	207	207	
Tars and other crude chemicals derived from coal, gas, and petroleum	51,841	32,367	17,239	Republic of Korea 10,737; Japan 4,188.

[r]Revised. NA Not available.
[1]Less than 1/2 unit.
[2]May include platinum-group metals.

COMMODITY REVIEW

METALS

Metal mining in Taiwan was insignificant and was inconsequential by world standards as well as for domestic requirements. In 1982, there were mine registrations for small operations for copper, gold, silver, iron, and manganese. Taiwan's primary metals industry was largely limited to aluminum, copper, and iron and steel, all of which required imported ore raw materials. While some gold and silver was produced from domestic mining operations, the bulk was recovered as a byproduct from the processing of imported copper concentrate. Supplementing primary metal production, Taiwan's large shipbreaking industry generated largely iron and steel scrap and indeterminant quantities of copper, lead, and other metal values.

Taiwan has 13 large industrial enterprises that are state-owned. Five of these are metal producers or users—Taiwan Aluminium Corp. (Talco), Taiwan Metal Mining Corp. (TMMCO) (copper), China Steel Corp. (CSC), China Shipbuilding Corp., and Taiwan Machinery Manufacturing Corp. The overall combined earnings of the 13 state-owned firms amounted to about $500 million, or only about one-half of the Government's projected earnings under the annual budget. Firms showing losses during 1982 included Talco, TMMCO, China Shipbuilding, and Taiwan Machinery. Talco was the enterprise with the largest losses, amounting to about $50 million in 1982. High energy costs, the domestic recession, and the weak world market were cited as causes for the poor performance of these enterprises. In early 1982, the Government began studying the possibility of merging or closing down the state-owned firms that have shown consistent losses or marginal performance.

Aluminum.—Talco shut down its old smelter, Kao-Hsiung I, in early 1981 because of its inefficiency and lack of pollution control. Kao-Hsiung II was inaugurated in June 1980 with an annual capacity of 50,000 tons. During 1982, Kao-Hsiung II operated at about 43% of installed capacity compared with 61% in 1981. The high cost of electricity and low metal prices in the international market were cited as the cause in the curtailment in operation capacity. Despite the cutback, Talco produced about 2,500 tons per month of sheet and coil from imported ingot and from its own metal production. If the smelter is shut down, Talco will concentrate on downstream operations. The company was expected to complete the construction in 1983 of an $80 million fabrication plant with a capacity of 83,000 tons per year of sheet, foil, and can stock.

Copper.—During 1981-82, TMMCO operated its 50,000-ton-per-year copper smelter-refinery near Keelung at full capacity. However, the company was financially weak, owing about $275 million in loans that reportedly have been accruing interest at a rate of $75,000 per day. The operation had been hurt by low copper prices as well as from management inefficiency at TMMCO. The Government decided in principle to sell the plant to downstream users of copper, but by yearend 1982 had not settled on the buyers nor the price.

Iron and Steel.—CSC operated the country's only integrated iron and steel mill at Kao-Hsiung. Installation of the second blast furnace was completed in early 1982. The furnace, initially fired on February 19, produced 5,000 tons of molten iron per day and boosted CSC's production of crude steel from 1.5 to 3.25 million tons per year. Two continuous slab casters were commissioned in February, and later in April, CSC began commercial operation of its 1.8-million-ton-per-year hot strip mill. In July, a 700,000-ton-per-year cold roll strip mill was placed into operation, essentially completing the second-stage expansion of CSC. The Kao-Hsiung complex also has a 900,000-ton-per-year billet mill, a 400,000-ton-per-year plate mill, a 300,000-ton-per-year bar mill, and a 300,000-ton-per-year wire rod mill. CSC had planned a stage-three expansion program to raise total steel capacity to 5.7 million tons per year by adding a steel mill in central Taiwan. However, because of the downturn in domestic demand and in the foreign market, the expansion program was indefinitely delayed.

Domestic mine output of iron ore was insignificant and sporadic. Virtually all of Taiwan's requirement for iron ore was met by imports from Australia, Brazil, and the Republic of South Africa. Likewise, coking coal was also imported primarily from Australia, the Republic of South Africa, and the United States. Taiwan, however, has a large shipbreaking industry encompassing

36 wharves at Kao-Hsiung. Shipbreaking in 1979 totaled 2.9 million light displacement tons, 2.0 million light displacement tons in 1980, and 1.8 million light displacement tons in 1981. About 10% of the scrap steel, mostly high-quality plate, was exported directly, and another 10% underwent reworking before being exported. The remainder was used domestically.

The commissioning of Taiwan's first stainless steel plant in May 1982 was postponed because of a delay in delivery of equipment. By November, however, Tang Eng Iron Works Co. Ltd. was completing the final stages of equipment testing, and commercial production from the 50,000-ton-per-year plant was scheduled for early 1983. Inco Ltd. of Toronto, Canada, and Talent Chemical Industrial Corp. planned the construction of a 7,000-ton-per-year nickel plant. Nickel oxide to be imported from Canada will be used to produce nickel shot and pig, which was expected to meet all of Taiwan's needs. Sixty percent of Tang Eng's production capacity was nickel-based stainless steel.

NONMETALS

Domestic mining of nonmetallic minerals centered largely around limestone, dolomite, and marble. Most of the limestone output was from captive mines of cement producers. Some local limestone was also used for sugar refining. The largest dolomite operation at Ch'ing-Ch'ang Shan was worked by CSC for use in its blast furnaces at Kao-Hsiung. Crystalline limestone, quarried in eastern Taiwan, was used by the cement and fertilizer industries. Larger size marble was used as decorative building stone. Other nonmetallic mineral production of only local significance included clays, feldspar, salt, and serpentine.

Cement.—Taiwan's cement industry was comprised of 17 plants operated by 11 companies. Total industry capacity was about 15.3 million tons per year. Taiwan Cement Corp. was the largest producer with a combined capacity of 5.27 million tons per year from four plants, followed by Asia Cement Corp. with 2.8 million tons per year from three plants, and Chia Hsin Cement Corp. with 1.2 million tons per year from one plant. Cement output during the year was about 86% of capacity. Although some cement was exported, most of the production was domestically consumed. In 1982, total construction was down 33% from that of 1981 to about 26 million square meters. Reinforced concrete construction, the largest sector, was down 40% to about 17.5 million square meters. The Government, however, decided to initiate some building programs earlier that were expected to aid the industry.

Fertilizer Materials.—Taiwan's fertilizer industry was dominated by large Government-owned companies with a number of smaller companies operated by the private sector. The Government-owned operations were China Phosphate Industries Corp., CPC, Kao-Hsiung Aluminum Sulphate Corp., TMMCO, and Taiwan Fertilizer Co. Ltd. Depressed demand and excess capacity in the Far East has dampened the industry. In 1982, there was only one expansion in progress; Taiwan Fertilizer was constructing a 99,000-ton-per-year sulfuric acid plant at Kao-Hsiung, scheduled for completion in 1984. This plant was to be the base of a new compound fertilizer complex to be built and operated by the company.

MINERAL FUELS

Taiwan produced only small quantities of coal, petroleum, and natural gas, and domestic energy output from all sources provided less than 15% of the country's total energy supply.

In 1982, electricity accounted for 30% of the commercial energy consumption—thermal power, 19%; nuclear power, 8%; and hydropower, 3%. Petroleum accounted for 41% of commercial energy consumption, with 7% for coal, about 5% for natural gas, and the remaining 17% for other, which included exports and losses. The major consumers of electrical energy by industrial sector were transportation, 12%; nonmetallic mineral products, 10%; chemicals, 9%; metallic products, 8%; energy, 7%; textiles, 6%; agriculture and food processing, 5%; wood products, 4%; and mining, 1%.

CPC conducted 4,421 kilometers of seismic, 4,011 kilometers of gravity, and 2,786 kilometers of magnetic survey for offshore oil and gas in 1982. Over the past decade, CPC had drilled 70 offshore wells singularly and in cooperation with foreign companies. Thirteen wells had commercially exploitable showings of oil and natural gas. However, since early 1981, there have been no significant finds. In 1982, CPC drilled 17 onshore wells: dissolved gas, 7; dry, 7; and completed as gas producers, 3. In 1983, CPC planned to allocate $100 million for exploration activities, which will include five offshore well drillings in an area off the north

coast.[7]

Since 1976, Taiwan's output of coal has declined annually to about 2.4 million tons in 1982. About 98% of the total output was from 169 pits operated by the private sector. The remainder was from two Government-owned pits. Seventy-four mining pits in Taipei prefecture accounted for 58% of the national output, with lesser amounts from Keelung, 14%; Miaoli, 13%; Hsin-Chu, 6%; Tasyuan, 5%; and other areas, 4%. By grade, 95% of the production was dust coal, and the remainder, lump coal. About 20% of the coal produced was classified as coking coal.[8]

[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from New Taiwan dollars (NT$) to U.S. dollars at the rate of NT$39.00=US$1.00.

[3]American Institute in Taiwan. State Department Airgram A-070, Nov. 29, 1982.

[4]Far Eastern Economic Review. Asia 1983 Yearbook. Hong Kong, 1982, pp. 257-262.

[5]Council for Economic Planning and Development. Industry of Free China. V. 58, No. 6, December 1982, 210 pp.

[6]Directorate-General of Budget, Accounting and Statistics. Monthly Statistics of the Republic of China. No. 205, January 1983, 268 pp.

[7]Council for Economic Planning and Development. Industry of Free China. V. 57, No. 5, November 1982, pp. 1-11.

[8]Taiwan Province Bureau of Mines. Reconstruction Statistic of Taiwan Province. Part 3, 1982, 148 pp.

The Mineral Industry of Thailand

By Gordon L. Kinney[1]

The mining industry accounted for $550 million[2] or 1.5% of Thailand's gross domestic product (GDP) in 1981. This was a decline from a high of 2.3% in 1979 and 2.1% in 1980. In 1982, the output in the mining sector, excluding natural gas, retracted markedly owing to diminishing demand from industrial countries and a drop in prices of Thailand's more important minerals; namely, tin, tungsten, lead, and tantalum. These factors led to a reduction in production and, in some cases, the temporary closing of some mines.

Even with the decline in output, Thailand ranked high among market economy countries as a producer of tantalum, first; tin, third; fluorite, fifth; barite, sixth; and tungsten, eighth. It also produced domestically important quantities of marl, gypsum, limestone, cement, antimony, lead, manganese, lignite, and natural gas.

In addition to the currently produced minerals, Thailand has one of the world's largest continuous deposits of rock salt. Potash layers have been identified within the salt beds and are being investigated. These are the only known potash deposits in South and Southeast Asia. Thailand has the potential to become a major regional supplier of K_2O fertilizer.

The September 1981 inauguration of natural gas production from the offshore Erawan Gasfield was heralded as the start of an era of low-cost energy. Serious production problems during 1982, however, dampened the enthusiasm and caused the Government to reconsider its industrial development plans.

Several natural gas-based industries were planned for the coastal area southeast of Bangkok where the new pipeline came ashore. A petrochemical complex based on the heavier hydrocarbons from a gas separation plant was one of the larger projects. Another project, a large ammonia-urea complex, was to be Thailand's first nitrogen fertilizer plant. A soda ash plant, a direct-reduction steel plant, and additional electric power capacity were all to be dependent upon the availability of low-cost natural gas. The export of liquefied natural gas (LNG) was also being contemplated.

Some of these plans may be delayed until the gas availability is clarified. The cause of the gas production shortfall was still being disputed. The critical fact remained that the cost of extracting the gas will be higher than originally anticipated. The cost of the delivered gas will be a major factor in the economic feasibility of most of the planned projects. If it is substantially cheaper than imported energy, some of the projects could still be built. The proposed multibillion dollar natural gas export plan is least likely to go forward because of high capital cost, questionable gas reserves, and political sensitivity.

One favorable development in 1982 was the finding of crude oil. Thai-Shell Exploration and Production Co. Ltd. was installing production facilities at its Lan Krabu oil discovery 360 kilometers north of Bangkok. Production was scheduled to start in January 1983 at a modest 5,000 barrels per day in what will be Thailand's first commercial oilfield.

Expansion of the minerals sector was an important objective of Thailand's ambitious fifth 5-year development plan. Existing information indicated that the mining industry potential was high and if properly developed could contribute to lowering Thailand's balance-of-trade deficit. In addition, it would generate rural employment and ex-

tend the infrastructure into remote and underdeveloped areas.

An accurate survey of the country's mineral resources was deemed essential. The Government proposed an airborne geophysical survey of the country to establish a comprehensive mineral resource data base that would be made available to domestic and international mining concerns. The project will include the following: (1) the airborne survey; (2) laboratory and field instruments and equipment for followup ground surveys; (3) construction of workshops, laboratories, and administrative facilities; and (4) provision for foreign consultants to assist project implementation and in-country training of personnel in geoscientific techniques. The project cost would be nearly $64 million. The Asia Development Bank proposed a $39 million loan to finance part of the costs. The airborne survey could be completed in three October-to-April flying seasons.[3]

Despite a slowdown from the more rapid growth of 1981, the Thai economy performed well in 1982, producing a real growth rate of 4.2% and out performing all of its Association of Southeast Asian Nations (ASEAN) economic partners except Singapore. The inflation rate was lowered from 12.7% to below 9% and the balance-of-trade deficit was also reduced. The current account deficit of $1.1 billion was a 57% reduction from the 1981 figure. The most rapid growth in the economy occurred in the business sector, which grew 11.5% in real terms. Agriculture's share of GDP dropped to 20.6%. The manufacturing sector, on the other hand, grew from $7.2 billion to $7.7 billion and in 1982 rivaled agriculture as the leading sector of the economy.

The year 1983 promised a pickup in the rate of economic activity. Real GDP growth was forecast at 5.5% to 6.0%. Agricultural output should expand only slightly although manufacturing could rise by 7%. Inflation was expected to remain moderate.[4]

PRODUCTION

Thai mineral production was down in value. Production of the important minerals dropped, such as antimony, manganese, tantalum, tin, and tungsten. Gypsum output increased in response to higher production of cement. The production of other basic cement ingredients increased as well. Thailand remained the number one producer of tantalum in the form of tin smelter slags, and the third largest producer of tin. The fledgling natural gas industry got off to an inauspicious start with production levels at less than one-half the contracted amount during the first full year of operation. Thailand's first commercial oilfield was tested at Lan Krabu in December. Production was expected to begin at the official dedication of the Sirikit Oilfield in January 1983 at a level of 5,000 barrels per day, increasing to nearly 20,000 barrels per day in 2 years.

Table 1.—Thailand: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Antimony:					
Ore and concentrate:					
Gross weight	6,759	6,905	6,862	2,820	[2]1,567
Metal content	2,873	2,935	2,916	1,199	[2]666
Metal, smelter	35	101	22	36	[2]28
Chromium: Chromite, gross weight	65	42	--	--	--
Columbium and tantalum ores and concentrates, gross weight:[3]					
Columbite	64	382	213	48	39
Tantalite	--	25	143		
Total	64	407	356	48	39
Stuverite (mixed columbite-tantalite)	--	231	301	46	10
Iron and steel:					
Iron ore:					
Gross weight	88,121	103,101	84,966	62,472	[2]26,750
Iron content	48,467	56,706	46,731	34,360	[2]15,713
Metal:					
Pig iron	[r]17,428	30,224	17,738	10,310	[2]6,338
Ferroalloys:					
Ferrosilicon	1,635	3,041	60	280	--
Ferromanganese	747	2,187	112	368	--

See footnotes at end of table.

Table 1.—Thailand: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Iron and steel —Continued					
Metal —Continued					
Steel:					
Crude	[r]346,000	[r]440,000	[r]450,000	300,000	[2]312,158
Semimanufactures (selected):					
Bars	NA	NA	321,517	109,711	[2]229,203
Galvanized iron sheets	84,808	85,000	129,342	151,620	[2]126,890
Tinned plates	43,939	40,000	70,183	78,834	[2]62,227
Lead:					
Mine output, metal content of 42.5% Pb concentrate	1,663	8,719	10,560	17,283	[2]18,500
Metal: Ingot, secondary	1,101	756	1,667	548	[2]929
Manganese ore:					
Chemical-grade, over 75% MnO_2	78	42	11	5	[2]12
Battery-grade and chemical-grade, 75% MnO_2	6,635	5,828	2,716	3,095	[2]3,398
Metallurgical-grade, 46% to 50% MnO_2	65,498	29,496	51,583	7,817	[2]4,348
Total	72,211	35,366	54,310	10,917	7,758
Rare-earth metals:					
Monazite concentrate, gross weight	--	32	152	107	[2]162
Xenotime	--	6	52	45	[2]46
Tin:					
Mine output, metal content	30,186	33,962	33,685	31,474	26,000
Metal: Smelter, primary	28,945	33,058	34,689	32,626	25,500
Titanium: Ilmenite concentrate, gross weight	482	780	--	37	[2]18
Tungsten concentrate:					
Gross weight	6,182	3,543	3,134	2,348	[2]1,661
Metal content	3,187	1,826	1,615	1,209	[2]855
Zinc: Smelter production	8	10	30	--	--
Zirconium ore and concentrate, gross weight	25	116	61	104	[2]196
NONMETALS					
Barite	274,564	378,654	305,057	307,046	[2]318,348
Cement, hydraulic thousand tons	5,091	5,255	5,337	6,263	[2]6,609
Clays:					
Ball clay	--	1,766	1,557	1,836	[2]2,200
Kaolin	33,764	42,769	19,934	14,086	[2]17,846
Kaolinite (dickite)	930	1,320	5,020	7,450	--
Diatomite	1,105	3,418	1,982	128	[2]80
Feldspar	32,583	26,428	24,158	24,243	[2]19,243
Fluorspar:					
Crude mine output:					
High-grade	175,531	177,730	172,784	157,311	176,000
Low-grade	84,255	82,122	133,547	113,667	180,000
Total	259,786	259,852	306,331	270,978	356,000
Salable product:					
Acid-grade (beneficiated low-grade)	55,000	56,574	60,108	55,181	81,000
Metallurgical-grade	175,531	177,730	172,784	157,311	176,000
Total	230,531	234,304	232,892	212,492	257,000
Graphite	23	--	2,074	1,800	[2]630
Gypsum	280,904	352,398	411,977	540,383	[2]753,433
Nitrogen: N content of ammonia	9,000	--	--	--	--
Phosphate rock, crude	3,485	4,542	5,570	5,800	[2]4,265
Salt:					
Rock	11,839	11,000	16,744	11,000	[2]11,100
Other[e]	165,000	165,000	165,000	165,000	165,000
Sand, silica	170,227	157,076	171,000	76,330	[2]82,820
Stone:					
Calcite	1,182	1,860	360	[e]500	[2]1,020
Dolomite	4,400	4,030	8,130	[e]8,000	[2]9,662
Limestone for cement manufacture only thousand tons	2,631	2,964	3,958	5,486	[2]6,371
Marble	--	4,896	5,649	8,016	[2]9,311
Marl for cement manufacture only thousand tons	1,460	2,262	1,939	1,787	[2]458
Quartz, not further described	22,220	22,240	7,828	[e]8,000	[2]7,531
Shale for cement manufacture only thousand tons	485	748	801	1,123	[2]1,248
Talc and related materials:					
Pyrophyllite	12,190	11,191	10,350	10,370	[2]19,989
Talc	2,698	2,351	1,376	1,665	[2]2,009
MINERAL FUELS AND RELATED MATERIALS					
Coal: Lignite thousand tons	639	1,356	1,427	1,686	[2]1,964
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	107	109	[e]110	[e]100	100

See footnotes at end of table.

Table 1.—Thailand: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products:					
Gasoline -- thousand 42-gallon barrels	12,965	14,535	11,511	11,558	[2]12,366
Jet fuel -- do	4,750	5,720	4,948	5,941	[2]5,648
Kerosine -- do	1,643	1,860	1,794	2,293	[2]2,277
Distillate fuel oil -- do	16,200	16,860	17,551	17,331	[2]17,879
Residual fuel oil -- do	19,673	19,980	16,180	17,018	[2]15,201
Liquefied petroleum gas -- do	1,374	1,450	1,536	1,730	[2]1,255
Naphtha -- do	1,955	1,920	1,530	1,275	1,300
Asphalt -- do	954	1,121	727	854	900
Unspecified -- do	223	e250	r e1,670	e1,740	1,710
Refinery fuel and losses -- do	1,692	e1,800			
Total -- do	61,429	65,496	r e57,447	e59,740	58,536

eEstimated. pPreliminary. rRevised. NA Not available.

[1]Includes data available through Aug. 4, 1983.

[2]Reported figure.

[3]Excludes columbium- and tantalum-bearing tin slags, which make Thailand the world's largest source of newly mined tantalum.

TRADE

The estimated value of trade fell slightly compared with that of 1981. Imports declined $800 million while exports were estimated to have increased $500 million. The balance-of-trade situation improved markedly from a deficit of $2.9 billion in 1981 to an estimated deficit of $1.6 billion in 1982. Imports of heavy oil declined as natural gas replaced some of the oil in Bangkok thermal powerplants. Exports of tin, fluorite, tungsten, and antimony declined in tonnage and value. Cement exports more than tripled as new production capacity gave Thailand a surplus after several years of large imports.

The country continued to import most of its energy needs, mostly in the form of crude oil and refined products. The imports of petroleum were expected to decrease in the coming years as domestic natural gas and crude oil production increases.

Table 2.—Thailand: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	(1)	56	--	Singapore 35; Oman 11; Malaysia 10.
Semimanufactures	1,554	803	--	Singapore 222; Malaysia 139; Japan 108.
Antimony:				
Ore and concentrate	5,704	5,268	250	Belgium-Luxembourg 3,167; United Kingdom 730; France 559.
Metal including alloys, regulus	5	16	--	All to India.
Columbium and tantalum: Ore and concentrate	558	203	27	Netherlands 91; West Germany 59; Singapore 25.
Copper: Metal including alloys, semimanufactures	1	28	--	Singapore 26.
Gold:				
Metal including alloys, unwrought and partly wrought -- troy ounces	(1)	373	331	Hong Kong 42.
Iron and steel: Metal:				
Scrap	1,423	1,373	47	Japan 1,120; Hong Kong 181.
Ferroalloys, unspecified	r65	--		
Steel, primary forms -- kilograms	--	240	--	All to Laos.
Semimanufactures:				
Bars, rods, angles, shapes, sections	528	349	--	Laos 107; Singapore 83; Burma 60.
Universals, plates, sheets	96	344	--	Singapore 184; Burma 150.
Hoop and strip	--	5	--	Mainly to India.
Wire	77	57	--	All to Laos.

See footnotes at end of table.

Table 2.—Thailand: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Tubes, pipes, fittings	91,641	59,241	291	China 12,824; Iran 12,920; Hong Kong 11,198.
Lead:				
Ore and concentrate	21,653	37,520	--	West Germany 13,000; Japan 12,000; Netherlands 6,000.
Metal including alloys:				
Scrap ---------- kilograms	--	31	--	All to Hong Kong.
Unwrought	10	2	--	All to Laos.
Semimanufactures	239	37	(1)	Indonesia 20; Hong Kong 10; Laos 5.
Manganese:				
Ore and concentrate, metallurgical-grade	50,820	16,900	--	Japan 14,000; Taiwan 2,500.
Oxides	--	20	20	
Metalloids: Unspecified	1,000	--		
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	3,215	--		
Silver:				
Waste and sweepings ------ value	$42,223	--		
Metal including alloys, unwrought and partly wrought thousand troy ounces	31	1,010	116	France 390; Belgium-Luxembourg 332.
Tin:				
Ore and concentrate	112	1,212	--	Netherlands 1,051; Japan 161.
Metal including alloys, unwrought	33,980	30,278	9,940	Netherlands 14,666; Japan 4,469.
Titanium: Ore and concentrate	(1)	12	--	All to Singapore.
Tungsten: Ore and concentrate	3,638	1,993	531	Netherlands 713; New Zealand 470; West Germany 239.
Zinc:				
Ore and concentrate	2	41	--	All to Netherlands.
Oxides	--	31	--	Sri Lanka 21; Singapore 10.
Metal including alloys, semimanufactures	r881	369	--	Laos 363.
Other:				
Ores and concentrates	537	107	--	Singapore 92; West Germany 15.
Ashes and residues	14,670	2,093	2,043	Netherlands 25; Singapore 15; India 10.
Base metals including alloys, all forms	--	79	1	Netherlands 37; Japan 12; Republic of Korea 10.
NONMETALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones ------- grams	373,860	140	100	Switzerland 40.
Grinding and polishing wheels and stones	81	278	1	Malaysia 211; Singapore 45; Laos 20.
Barite and witherite	r339,357	234,091	57,900	Indonesia 90,350; Singapore 17,332; Saudi Arabia 16,827.
Cement	61,549	55,861	--	Singapore 23,783; Malaysia 18,277.
Chalk	(1)	28	--	Philippines 18; Singapore 10.
Clays and clay products:				
Crude:				
Kaolin	1,130	515	--	Singapore 326; Taiwan 125.
Unspecified	1,415	90	--	Taiwan 56; Japan 17; Malaysia 10.
Products:				
Nonrefractory	21,124	33,952	164	West Germany 12,743; Singapore 11,352; Netherlands 3,969.
Refractory including nonclay brick	r1,714	4,026	1	Singapore 2,305; Indonesia 785; Philippines 564.
Diamond:				
Gem, not set or strung ---- carats	5,871	22,466	203	Hong Kong 11,706; Japan 3,807; Belgium-Luxembourg 3,767.
Industrial ---------- do ----	r3,576	--		
Diatomite and other infusorial earth	--	1	--	All to Republic of Korea.
Feldspar, fluorspar, related materials:				
Feldspar	2,874	2,792	--	Malaysia 2,038; Singapore 648.
Fluorspar	226,305	221,838	--	Japan 103,306; U.S.S.R. 67,000; Taiwan 14,480.
Fertilizer materials:				
Crude, n.e.s	1,153	1,410	--	Malaysia 1,308; Saudi Arabia 100.
Manufactured:				
Ammonia	3	3	--	All to Laos.
Nitrogenous	1	40	--	Do.
Phosphatic ------ kilograms	1,000	160	--	Do.
Potassic	(1)	20	--	Do.
Unspecified and mixed	2,000	290	--	Saudi Arabia 288.
Graphite, natural	77	--		

See footnotes at end of table.

Table 2.—Thailand: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Gypsum and plaster	147,169	216,625	--	Malaysia 107,198; Indonesia 61,450; Taiwan 20,890.
Halogens: Chlorine, kilograms	1,210	20	--	All to Vietnam.
Lime	--	33	--	All to Singapore.
Magnesium compounds: Magnesite	--	26	--	All to Taiwan.
Pigments, mineral: Iron oxides and hydroxides, processed	18	--		
Precious and semiprecious stones other than diamond:				
Natural:				
Precious, thousand carats	17,222	27,492	7,441	West Germany 9,212; Switzerland 2,537; Hong Kong 2,086.
Semiprecious, kilograms	539,567	120,391	4,583	Hong Kong 112,756; Taiwan 1,146; Switzerland 1,041.
Synthetic[2], do.	63	49	4	Singapore 30; United Kingdom 9.
Salt and brine	123,989	101,482	(1)	Malaysia 70,977; Singapore 30,011.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	1	2	--	Mainly to Burma.
Sodium hydroxide	17	--		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	270	--		
Worked	446	154	(1)	Taiwan 150.
Dolomite, chiefly refractory-grade	--	3,268	--	All to Singapore.
Gravel and crushed rock	58	26	--	Laos 18; Malaysia 8.
Limestone other than dimension	189	2,566	--	Singapore 2,253; Malaysia 103.
Quartz and quartzite	9,600	5,368	--	Japan 5,250; Taiwan 108.
Sand other than metal-bearing	10	37	--	Mainly to Malaysia.
Sulfur:				
Elemental:				
Crude including native and by-product	10	--		
Colloidal, precipitated, sublimed	428	260	--	Indonesia 200; Sri Lanka 60.
Dioxide	--	9	--	All to Hong Kong.
Sulfuric acid	555	--		
Talc, steatite, soapstone, pyrophyllite	3,050	2,384	--	Sri Lanka 1,201; Indonesia 1,025.
Other:				
Crude	10	76	(1)	Malaysia 40; West Germany 15.
Slag and dross, not metal-bearing	3,901	2,880	23	Japan 1,042; India 990; Taiwan 464.
Oxides and hydroxides of barium, magnesium, strontium, kilograms	500	297	--	All to Malaysia.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	r12,878	21,142	--	Malaysia 9,670; Hong Kong 5,328; Singapore 4,643.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	51	150	--	Singapore 86; Malaysia 40; Hong Kong 20.
Carbon: Carbon black	2,003	6,034	--	India 4,496; Indonesia 642; Sri Lanka 341.
Coal:				
Anthracite and bituminous including briquets	1,306	1,148	--	Sri Lanka 358; Pakistan 255; Republic of Korea 234.
Lignite including briquets	1	9,601	--	All to Taiwan.
Coke and semicoke	20	--		
Hydrogen, helium, rare gases, kilograms	600	3,060	--	Laos 3,000; Burma 60.
Petroleum refinery products:				
Liquefied petroleum gas, 42-gallon barrels	151	248	--	Malaysia 190; Indonesia 58.
Gasoline, motor, do.	6	1,093	--	Malaysia 1,090.
Mineral jelly and wax, do.	--	6	--	Taiwan 4.
Kerosine and jet fuel, thousand 42-gallon barrels	1,301	1,105	21	Laos 485; India 79; China 70.
Lubricants, 42-gallon barrels	497	46,077	1	India 7,574; Philippines 6,565; Hong Kong 6,434.
Nonlubricating oils, do.	1,496	764	--	Indonesia 694; Malaysia 69.
Bitumen and other residues, do.	6,427	2,716	--	Singapore 2,436; Malaysia 217; Hong Kong 63.
Bituminous mixtures, do.	2,606	242	--	All to Malaysia.
Tars and other crude chemicals derived from coal, gas, and petroleum, kilograms	56	4,518	--	Singapore 4,500.

rRevised.
[1]Less than 1/2 unit.
[2]Includes reconstructed semiprecious stones.

Table 3.—Thailand: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	44	34	(1)	Mainly from West Germany.
Aluminum:				
Ore and concentrate	205	8,964	--	Malaysia 6,113; Canada 1,500; China 1,350.
Oxides and hydroxides	13,016	9,960	55	China 7,383; Japan 2,055.
Metal including alloys:				
Scrap	81	96	--	Hong Kong 86; Australia 5; France 5.
Unwrought	44,908	51,774	8,773	Canada 19,014; Australia 4,777; Ghana 4,156.
Semimanufactures	3,263	3,031	725	Japan 782; Australia 409; France 310.
Antimony:				
Ore and concentrate	15	3	--	All from Burma.
Metal including alloys, all forms	20	10	--	All from China.
Cadmium: Metal including alloys, all forms kilograms	109	30	5	Australia 20; Switzerland 3.
Chromium:				
Ore and concentrate	56	1,337	--	Philippines 1,300; Belgium-Luxembourg 34.
Oxides and hydroxides	354	530	188	West Germany 215; U.S.S.R. 70.
Metal including alloys, all forms kilograms	692	--		
Cobalt:				
Oxides and hydroxides	92	4	(1)	Canada 2; Japan 1; Netherlands 1.
Metal including alloys, all forms kilograms	--	261	--	Belgium 150; United Kingdom 31; Japan 30.
Columbium and tantalum:				
Ore and concentrate	--	34	--	All from Australia.
Metal including alloys, all forms, tantalum kilograms	--	1	1	
Copper:				
Matte and speiss including cement copper	--	150	--	All from Chile.
Sulfate	245	283	250	United Kingdom 33.
Metal including alloys:				
Scrap	337	373	126	Hong Kong 234.
Unwrought	4,468	5,365	--	Zambia 3,062; Chile 1,163; Japan 1,138.
Semimanufactures	12,782	12,057	148	Japan 8,656; Republic of Korea 1,330.
Gold:				
Metal including alloys, unwrought and partly wrought troy ounces	12,686	12,029	9,042	Singapore 2,954.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	r614	164	--	Malaysia 130; Burma 34.
Metal:				
Scrap	337,670	417,183	65,572	Italy 86,315; West Germany 57,623; Taiwan 34,093.
Pig iron, cast iron, related materials	r5,168	27,770	(1)	Australia 12,019; China 7,411; Hong Kong 4,234.
Ferroalloys:				
Ferrochromium	147	15	--	Japan 13; Sweden 2.
Ferromanganese	3,933	2,874	--	Australia 2,176; Japan 438; China 139.
Ferronickel	50	--		
Ferrosilicomanganese	463	1,291	--	Australia 1,229; Taiwan 60.
Ferrosilicon	3,392	3,303	2	China 1,314; Yugoslavia 750; Norway 353.
Unspecified	580	864	9	Australia 627; Taiwan 140; Japan 30.
Steel, primary forms	r512,365	359,831	1,155	Japan 86,851; Republic of Korea 59,147; Australia 52,983.
Semimanufactures:				
Bars, rods, angles, shapes, sections	210,462	274,106	125	Japan 217,937; China 14,361; Bulgaria 10,891.
Universals, plates, sheets	574,359	697,301	28,511	Japan 456,068; Canada 60,752; Republic of Korea 42,405.
Hoop and strip	10,554	11,222	71	Japan 8,180; Republic of Korea 666; West Germany 556.
Rails and accessories	1,014	1,319	--	Austria 609; Belgium-Luxembourg 147; Japan 146.
Wire	16,455	14,267	56	Japan 7,969; Republic of Korea 2,930; China 798.
Tubes, pipes, fittings	21,545	42,284	185	Japan 39,308; United Kingdom 1,488; Sweden 383.
Castings and forgings, rough	1	--		
Unspecified thousand tons	468	--		

See footnotes at end of table.

Table 3.—Thailand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides	403	336	(1)	Australia 307.
Metal including alloys:				
Scrap	253	25	--	All from Singapore.
Unwrought	16,780	12,650	245	Australia 8,399; Taiwan 2,665.
Semimanufactures	61	179	(1)	Belgium-Luxembourg 87; West Germany 48.
Magnesium: Metal including alloys:				
Unwrought	16	10	8	Australia 1; Japan 1.
Semimanufactures kilograms	163	226	123	United Kingdom 78; West Germany 25.
Manganese:				
Ore and concentrate, chemical-grade	--	3	--	All from Netherlands.
Oxides	160	548	--	Singapore 210; Japan 192; China 115.
Metal including alloys, all forms	15	8	7	France 1.
Mercury 76-pound flasks	365	580	(1)	China 347; Japan 166; West Germany 47.
Metalloids:				
Arsenic:				
Oxides and acids	99	75	--	Belgium-Luxembourg 32; France 28; Australia 10.
Metal including alloys, all forms	15	8	7	France 1.
Phosphorus	34	22	--	Japan 10; Sweden 9; China 3.
Silicon kilograms	19,770	135	--	Australia 125; Taiwan 10.
Unspecified	8	35	1	West Germany 28.
Molybdenum: Metal including alloys, all forms kilograms	972	3,488	--	Taiwan 2,887; United Kingdom 472.
Nickel:				
Matte and speiss	10	--		
Metal including alloys:				
Unwrought	338	415	3	Canada 202; Norway 64; Australia 53.
Semimanufactures	831	1,728	(1)	Republic of Korea 980; West Germany 452; Japan 280.
Platinum-group metals:				
Waste and sweepings[2] value	$1,036	$38	--	All from Japan.
Metal including alloys, unwrought and partly wrought troy ounces	1,222	[3]6,912	--	Japan 4,019; Hong Kong 2,893.
Silver:				
Ore and concentrate[2]	14	1,220	--	Guyana 1,000; China 220.
Waste and sweepings value	--	$335	--	All from United Kingdom.
Metal including alloys, unwrought and partly wrought thousand troy ounces	463	6,207	3	Japan 5,955.
Tin:				
Oxides	8	1	(1)	Mainly from Japan.
Metal including alloys:				
Unwrought	5	3	--	United Kingdom 2; Denmark 1.
Semimanufactures	88	22	5	Japan 10; United Kingdom 3.
Titanium:				
Ore and concentrate	930	955	--	Australia 910.
Oxides	555	602	3	Belgium-Luxembourg 225; Japan 211; West Germany 63.
Tungsten: Metal including alloys, all forms kilograms	1,131	3,246	102	Japan 3,087.
Zinc:				
Oxides	191	489	3	China 200; Japan 127; Taiwan 70.
Blue powder	55	109	--	Norway 40; Singapore 35; United Kingdom 14.
Metal including alloys:				
Scrap	30	150	--	All from Australia.
Unwrought	34,423	38,716	--	Australia 23,794; Canada 5,687; Japan 4,513.
Semimanufactures	245	76	--	Yugoslavia 27; Belgium-Luxembourg 20; West Germany 13.
Other:				
Ores and concentrates	12,466	4,751	--	China 3,580; Japan 1,033; Australia 122.
Pyrophoric alloys	176	51	1	China 50.
Base metals including alloys, all forms	6	5	(1)	Japan 4.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,938	3,441	53	Netherlands 1,979; India 949; Spain 169.

See footnotes at end of table.

Table 3.—Thailand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Abrasives, n.e.s. —Continued				
Artificial:				
Corundum	521	395	--	Japan 386; Italy 9.
Silicon carbide	301	455	--	China 149; West Germany 141; Poland 85.
Dust and powder of precious and semiprecious stones, including diamond kilograms	204	91	e8	Switzerland 10; United Kingdom 10.
Grinding and polishing wheels and stones	1,822	2,024	5	Japan 776; Taiwan 474; China 323.
Asbestos, crude	58,756	57,193	2,813	Canada 13,840; Botswana 12,801; Zimbabwe 11,154.
Barite and witherite	55	36	--	United Kingdom 18; West Germany 16.
Boron materials: Oxides and acids	72	199	161	China 30.
Cement	942	108,532	225	Japan 108,056.
Chalk kilograms	300	754	704	United Kingdom 50.
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	5	4	(1)	Mainly from Japan.
Bentonite	848	2,563	1,648	China 580; Japan 148; Indonesia 136.
Fire clay	60	40	--	All from Japan.
Kaolin	3,800	4,174	402	Australia 2,070; Japan 846; United Kingdom 469.
Unspecified	10,488	7,495	3,835	United Kingdom 1,277; Japan 955; Netherlands 828.
Products:				
Nonrefractory	68	7	(1)	Mainly from Japan.
Refractory including nonclay brick	r8,632	3,325	99	United Kingdom 673; Japan 590; West Germany 482.
Cryolite and chiolite kilograms	--	1	--	All from Sweden.
Diamond:				
Gem, not set or strung carats	22,506	191,319	234	India 86,734; Belgium-Luxembourg 52,339; Republic of South Africa 17,110.
Industrial do	72,076	73,427	50,000	Ghana 7,300; Netherlands 6,000; Congo 4,300.
Diatomite and other infusorial earth	35	89	34	Republic of Korea 25; Netherlands 18; West Germany 11.
Feldspar, fluorspar, related materials:				
Feldspar	1,877	2,630	(1)	India 2,000; Finland 434; Japan 146.
Fluorspar	879	408	--	Canada 219; Finland 144; Japan 45.
Unspecified	154	18	--	All from Canada.
Fertilizer materials:				
Crude, n.e.s	--	9	9	
Manufactured:				
Ammonia	1,689	1,972	1	Indonesia 731; Japan 609; Belgium-Luxembourg 321.
Nitrogenous	177,338	257,819	--	Japan 93,835; Belgium-Luxembourg 63,925; West Germany 36,480.
Phosphatic	14,736	5,123	3,623	Netherlands 1,500.
Potassic	29,505	34,483	5,000	Canada 10,628; East Germany 5,150; France 5,000.
Unspecified and mixed	473,402	473,125	142,977	Romania 122,743; Norway 52,783; Republic of Korea 39,608.
Graphite, natural	913	864	--	Republic of Korea 460; China 303; Sri Lanka 50.
Gypsum and plaster	562	250	35	Japan 93; West Germany 64; China 55.
Halogens:				
Bromine kilograms	13	23	--	All from West Germany.
Chlorine do	540	15	--	All from Japan.
Fluorine do	--	187	187	
Iodine do	1,917	2,002	17	Japan 1,300; Netherlands 400; West Germany 203.
Lime	45	120	--	All from United Kingdom.
Magnesium compounds:				
Magnesite	10,671	5,571	--	Japan 3,758; China 1,200; Netherlands 445.
Oxides and hydroxides	78	102	2	China 40; Japan 28; Ireland 17.
Mica:				
Crude including splittings and waste	120	82	12	Japan 24; China 21; India 15.
Worked including agglomerated splittings	29	47	(1)	Japan 24; India 21.

See footnotes at end of table.

Table 3.—Thailand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Phosphates, crude	357	6	--	All from Australia.
Pigments, mineral:				
Natural, crude	--	1	--	All from Japan.
Iron oxides and hydroxides, processed	1,779	2,501	35	West Germany 1,571; Japan 348; India 225.
Precious and semiprecious stones other than diamond:				
Natural:				
Precious ___ thousand carats	136,303	203,355	13,264	Australia 126,120; Burma 13,883; Mozambique 10,174.
Semiprecious ____ kilograms	r133,186	161,538	385	Burma 133,578; Australia 11,362; Hong Kong 7,405.
Jet	--	30	--	All from Japan.
Synthetic _____ thousand carats	21,217	49,436	13,363	Switzerland 13,716; France 11,108; Brazil 5,142.
Pyrite, unroasted ____ kilograms	100	50	--	All from China.
Salt and brine	425	345	25	United Kingdom 150; Australia 85; West Germany 43.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	73	352	(1)	Japan 113; France 90; West Germany 88.
Sodium carbonate, natural and manufactured	64,330	65,266	14,128	Romania 23,390; France 12,601; Kenya 5,700.
Sodium hydroxide	26,511	24,997	2,255	Japan 17,186; Poland 3,196; Republic of Korea 716.
Sodium sulfate, natural and manufactured	20,772	9,398	3,450	Japan 4,166; Taiwan 1,350.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	150	7,525	(1)	Italy 7,522.
Worked	722	297	(1)	Italy 200; Japan 37; France 36.
Dolomite, chiefly refractory-grade	42	372	--	Taiwan 230; Norway 142.
Gravel and crushed rock	905	983	--	France 678; China 280.
Limestone other than dimension	100	13	(1)	Mainly from China.
Quartz and quartzite	119	121	2	Hong Kong 80; United Kingdom 20; Japan 18.
Sand other than metal-bearing	412	173	12	Norway 72; Australia 52; France 23.
Sulfur:				
Elemental:				
Crude including native and by-product	39,714	24,527	(1)	Canada 18,824; Singapore 5,236.
Colloidal, precipitated, sublimed	294	193	(1)	Taiwan 110; Japan 57; West Germany 16.
Dioxide	5	265	--	Poland 250.
Sulfuric acid	88	5,063	11	Republic of Korea 3,016; Japan 2,000.
Talc, steatite, soapstone, pyrophyllite	11,776	13,458	25	Republic of Korea 7,412; China 5,380; Taiwan 620.
Other:				
Crude	3,269	4,191	(1)	Singapore 2,610; China 791; West Germany 380.
Slag and dross, not metal-bearing	32	16	--	All from Japan.
Oxides and hydroxides of barium, magnesium, strontium	2,098	109	7	Ireland 69; Japan 25.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	813	2,269	591	France 754; Taiwan 255; Japan 240.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural kilograms	1	--		
Carbon:				
Carbon black	13,592	6,308	1,340	China 3,344; Japan 842; Taiwan 270.
Gas carbon ____ kilograms	--	9	9	
Coal, all grades including briquets	19,235	32,655	--	Indonesia 20,308; China 8,310; Vietnam 4,000.
Coke and semicoke	69,861	32,863	--	Japan 24,491; China 6,908; Taiwan 1,400.
Hydrogen, helium, rare gases	65	95	(1)	Australia 38; Singapore 34; Japan 14.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	58,788	50,002	--	Saudi Arabia 28,316; Qatar 8,312; Malaysia 3,286.
Partly refined ____ do	3,234	10,399	--	All from Saudi Arabia.
Refinery products:				
Liquefied petroleum gas do	860	1,466	5	Singapore 1,055; Philippines 150; Japan 114.

See footnotes at end of table.

Table 3.—Thailand: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Gasoline:				
Aviation thousand 42-gallon barrels	171	77	--	Italy 37; Singapore 22; Taiwan 18.
Motor do	2,555	1,831	--	Singapore 1,555; Bahrain 182.
Mineral jelly and wax do	64	89	3	China 60; Indonesia 4; Japan 4.
Kerosine and jet fuel do	49	770	--	Singapore 720; Bahrain 50.
Distillate fuel oil do	r9,559	7,785	--	Singapore 6,155; China 1,180.
Lubricants do	195	210	20	China 94; Singapore 49; Japan 35.
Nonlubricating oils do	968	935	7	Singapore 788; Australia 62; Netherlands 39.
Residual fuel oil do	8,512	5,838	1,273	Singapore 3,448; Japan 680; Democratic People's Republic of Yemen 280.
Bitumen and other residues do	11	4	--	Netherlands 2; Republic of Korea 1.
Bituminous mixtures do	11	8	(1)	United Kingdom 5.
Petroleum coke do	60	17	17	
Tars and other crude chemicals derived from coal, gas, and petroleum	19,052	15,880	14,044	Taiwan 824; Japan 498; Belgium-Luxembourg 239.

rRevised.
[1]Less than 1/2 unit.
[2]May include other precious metals.
[3]Total excludes unreported quantity valued at $18,200.

COMMODITY REVIEW

METALS

Iron and Steel.—Little progress was seen on implementing plans for major new steelmaking facilities in Thailand. Siam Ferro Industry Co. Ltd.'s plans for a large sponge iron complex were suspended indefinitely. In addition, plans for an integrated steelworks are still at the level of feasibility studies.

Energy costs will be high for whatever type plant is chosen and even gas-based direct-reduction may no longer be viable in light of current gas production and pricing problems.

Thailand's major steelmakers have been suffering large monetary losses because of depressed demand and fierce competition in the domestic market. They operated at 40% of capacity during the year.

Tantalum and Columbium.—Thailand Tantalum Industries Co. Ltd. (TTIC) awarded a $1.5 million contract to Chachaval de Weger International Co. for design, project management, and start of construction of the country's first tantalum and columbium processing plant. The plant was designed to process 2,000 tons[5] per year of tantalum and columbium-bearing tin smelter slags. The $45 million plant will be financed through the International Finance Corp. of the International Bank for Reconstruction and Development (World Bank), which will have an equity of up to 10% in the project.

Siteclearing and groundbreaking for the plant were held in 1982, but the pace of construction was very slow at yearend. A revised construction schedule put the plant completion date into 1986. When completed, the plant will allow Thailand to export higher value ferrotantalum and tantalum and columbium oxides. Currently, only low-value tin slags are exported. The Thaisarco smelter and TTIC were reportedly negotiating the price TTIC will pay for the slags. TTIC was awarded the processing monopoly for the tin slags and has the option to embargo slag exports 1 year before the new plant is due to begin production.

Tin.—Tin was again the most important mineral produced in terms of employment, tax revenue, and foreign exchange earnings. Tin accounted for 90% of the nonfuel mineral royalty paid to the Government and over 80% of mineral export earnings.

The tin miner's problems continued, however, as export tin prices declined early and remained low throughout the year. The depressed demand in most industrialized countries and the sale of tin from the U.S.

strategic stockpile in December 1981 were apparently the main causes of the lower prices. The International Tin Council (ITC) imposed export quotas on producing countries since April 1982 and bought tin off the market in May to support prices. These measures stabilized tin prices but at a relatively low level.

Discouraged by low prices, Thai tin production fell again. The export value also declined in the first three quarters of the year. An exacerbating factor was that the quarterly export quota for Thailand did not correspond with offshore mining production, which is dictated by the monsoon climate. The export quota for the last quarter of 1982 of 4,769 tons was 2,000 tons smaller than the output in that quarter.

Thailand, therefore, proposed to set up a tin stockpile to enable miners to sell their output during the 7-month offshore production season, even when it exceeded the ITC quarterly quotas. Reportedly, Government agencies with the help of local banks would buy and sell the tin. The stockpile was to be started by April 1983. The ITC rejected a Thai request for an annual, rather than quarterly, quota.[6]

The Department of Mineral Resources (DMR) proposed an across-the-board cut in the tin royalty of roughly $0.13 per pound. The cut was needed because rising costs and declining ore grades made many of the smaller mining operations barely marginal under the prevailing low prices. It would also encourage increased production and presumably reduce smuggling. The proposed cut was controversial as opponents claimed that only a few would benefit and the Government would not be able to make up the substantial loss of tax revenue produced by the cut. The tax was last reduced in July 1981. The Thai Cabinet was to make the decision on the tax issue in February 1983.

As more of the rich offshore deposits of tin are worked out, mining new deposits conflicts with environmentalists who oppose dredging near unspoiled resort beaches. The Patong Bay at Phuket was closed to dredging in 1981 because of environmental reasons. The environment also became an issue for nearby Karon Bay. Associated Mine (Thailand) Co., an affiliate of Sethasap Karnrae Co., began dredging Karon Bay in May 1981 with Government approval. A silting problem was later encountered when equipment on the dredge malfunctioned and DMR stopped the mining operation. Since the problem affected the stability of the whole area, the matter was referred to the Cabinet for decision. In April 1982, the Cabinet referred the matter to the National Environmental Board for study and policy recommendation.[7]

The drop in tin production and declining reserves has sparked an increase in offshore exploration activity. In 1981, the preliminary survey of the offshore west of Phuket to the Burma border showed encouraging results at water depths of 30 to 45 meters. A detailed drilling program was underway in 1982 to delineate the prospects and estimate the ore reserves. If the results are favorable, a feasibility study will be conducted. At the depth studied, mining would require new dredging technology.

On the eastern side of Phuket, the state-owned Offshore Mining Organization (OMO) was to survey an area of 1,800 hectares at water depths less than 60 meters. This is one of the few virgin areas of the east coast and OMO was confident of finding economic deposits. OMO would reserve the area for its new dredge, Bodan, which would operate in the Andaman Sea during good weather and in sheltered Phuket Bay during the southwest monsoon. The survey was expected to take 2 years and be assisted by experts from the United Nations.

OMO also planned to search for tin along the eastern seaboard of the Gulf of Thailand from Si Racha south to nearly the Kampuchean border. Preliminary surveys indicated tin deposits in the area. If the findings are favorable, OMO will consider building another dredge.[8]

The Thai-Malaysian consortium, Sea Minerals Ltd.[9] received a 6,400-hectare concession off the Thai coast near Takuapa. The company was to begin the 3-year exploration program as soon as possible. The concession was limited to waters deeper than the Government's 30- to 45-meter survey area.[10] Ore deposits at water depths between 45 and 65 meters would be technically difficult to mine but would be free of suction boat poachers.

According to DMR, the Thai Government spent more than $1.4 million between June 1981 and August 1982 combating illegal mining and smuggling of ore, mostly tin and some tungsten. DMR confiscated ore and equipment worth $3 million during the period. Reportedly, during the same period, the number of dredges operating illegally in the Andaman Sea was reduced from 3,000 to 800. The Government has estimated that 70% of the suction boat output was smug-

gled to other countries where the royalty was much lower. The remaining 30% was legally sold to OMO or the Provincial authorities. The legally reported suction boat output in recent years ranged from 33% to 43% of total tin production. If the Government's estimate was even roughly accurate, the loss of revenue and foreign exchange earnings would be a significant portion of the value of the mining sector output.

The Thai Pioneer Enterprise Co. Ltd. smelter closed in May 1982 and did not reopen through yearend. The new plant began operating in February 1981. The smelter was closed because of a shortage of tin concentrate, a declining market for tantalum-bearing tin slag, and tight cash flow. The smelter also had a design problem that required a $400,000 equipment purchase for correction. Two Thai family-owned mining companies were reportedly going to increase the company's registered capital from $3 million to $7 million so the company could resume production.

Tungsten.—Stora Kopparbergs Bergslangs AB, a Swedish mining company, has taken a 45% equity in a tungsten mine at Doi Mok in Chiang Rai Province about 650 kilometers north of Bangkok. Sirithai Scheelite Ltd., a local company, has a 40% interest in the venture. The open pit mine will be designed to yield at least 430 tons per year of tungsten, presumably concentrate, for sale to the Swedish steel industry. Production reportedly could be increased if world market prices increased significantly.[11]

Thai production and exports of tungsten continued declining for the fourth year. Depressed prices, a high fixed royalty, increased costs, the closing of the Khao Soon Mine, and declining ore grade at the Doi Ngom Mine in northern Thailand contributed to the decline.

Zinc.—In June, construction began on the Tak smelter, 400 kilometers north of Bangkok near the Burma border, after 12 years of planning and financial problems. The Thai Government assisted in the formation of the Padaeng Industry Co., which will own and operate the mine and smelter. There was a change in equity after the agreement was approved in late 1981. Mitsui & Co. (Thailand) increased its share to 6% by buying part of Sino-Thai Engineering and Construction Co.'s interest, thereby reducing Sino-Thai's share to 4%. Seventy percent of Padaeng is owned by the Government and private companies of Thailand. The other 30% is owned by foreign companies. Total investment was revised to about $140 million.[12]

The smelter, to be completed by October 1984, will have a capacity of 60,000 tons per year of ingot. The measured ore reserves, located 80 kilometers west of Tak at Mae Sot, are sufficient to supply the smelter for 11 years. Although the Thai Government surveyed the deposit, a Canadian company will reevaluate the reserves. The early work showed the deposit to be an isolated outcrop of 3.5 million tons of zinc silicate ore grading 20% to 25% zinc.

Initially, one-half of the metal will be used domestically and the balance will be exported to the other members of ASEAN. The smelter will require 30,000 tons per year of sulfur to produce sulfuric acid for the electrolytic process.[13]

NONMETALS

Cement.—The Siam Cement Co. and Siam City Cement Co. expansions were completed and clinker capacity was believed to be 8.8 million tons per year for the country at yearend. At least one other kiln was probably under construction.

Siam Cement has a potential problem with natural gas supply. Construction of a new pipeline was progressing well and is scheduled for completion in the spring of 1983. The $56 million pipeline was to supply fuel for two of its cement plants. However, a production shortfall at the Erawan Gasfield made it unlikely that any gas would be available to the line when completed, and the supply is expected to be much less than planned when supply is initiated. Siam Cement was counting on the gas to lower energy costs, which are 50% of the production cost. The Government could sell oil to Siam Cement at a reduced rate to offset the gas-related losses.

A domestic company, Union Thai Industry Co., has applied to the Government for tax privileges to build a 1-million-ton-per-year cement plant in Lopburi Province. Since the country's cement capacity exceeded domestic needs, the application was expected to be rejected.[14]

Fertilizer Materials.—*Nitrogen.*—Negotiations between the Government and a Scandinavian consortium for a $590 million nitrogen fertilizer complex near Rayong were terminated in July. The main points of contention were: (1) an agreement on natural gas price could not be reached, particularly on future price escalations, and an eventual price ceiling; (2) the equity of the consortium; (3) the rate of return on the company's investment; and (4) the condition that the price of fertilizer produced be

substantially lower than that of imported fertilizer.[15] The original Scandinavian proposal was considered by analysts to be the best offer any foreign group could make.

After terminating negotiations, the Government established the National Fertilizer Corp. in which it held 45% equity. Other holders were Thai Central Chemical Co., 22.5%; Fertilizer Traders Association, 21.12%; Fertilizer Producers Association, 1.38%; and a joint holding of 10% by 12 domestic banks.[16] The new corporation, with $2.2 million registered capital, will study whether the fertilizer complex is economical under the terms and conditions established by the Government. If it is decided to build the much needed plant, the Scandinavian group could be chosen for engineering and construction.

The plant would require 65 million cubic feet per day of natural gas. If the gas cannot be furnished reliably and at a price for the fertilizer to be sold at a profit and less than the cost of imported fertilizer, it is doubtful the plant will be built.

Phosphorus.—Thailand produced an insignificant amount of its phosphorus-fertilizer needs from domestic phosphate rock. Although small phosphate deposits have been located in nine Provinces, the only producing areas were in Lamphun, Rat Buri, and Phetchabun Provinces. The phosphate rock was hand sorted to 30% P_2O_5 content, ground, and used locally in this form as fertilizer.

Thailand has, however, reportedly opened the first commercial plant in the world using a new dry-process phosphate fertilizer production system. The plant is owned by the Siam Chemical Co. Ltd., Bangkok, and was built by Polimex-Cekop Ltd. of Poland. The process, a dry treatment of phosphate rock with gaseous sulfur trioxide, was developed by Polimex in cooperation with the Institute of Chemical Engineering of Warsaw Technical University. The process was claimed to be very energy and cost efficient. The cost of production was 10% to 30% lower, and capital investment per unit of P_2O_5 was 60% lower than an equivalent sulfuric acid and triple super phosphate installation. The variable mix of phosphorus compounds produced by the dry process provides a combined short-, medium-, and long-term availability of plant-usable phosphorus. In addition, it is a dry, noncaking powder, easy to granulate, and mixes well with other fertilizer components when made into compound fertilizers. Tests of the effectiveness on crops growing on acidic tropical soils indicated excellent results, particularly on rice.[17]

Potash.—Exploration and development of the Thai potash deposits was expected to increase following the Goverment's agreement to relinquish rights to revoke exploitation concessions for 5 years. This prerogative had been an obstacle to active detailed exploration. Three groups hold concessions to explore and develop the deposits. The first group, Duval Corp., CRA Exploration Pty. Ltd., and Siam Cement in Khon Kaen and Maha Sarakham Provinces; the second, Agrico Chemical Co. and Thai Central Chemical Co. partnership in Udon Thai Province; and the third, Amax Exploration Co. and Siam Cement joint venture in Sakon Nakhon Province. These are the only known major potash deposits in South and East Asia.[18]

Fluorspar.—The fluorite production decline, which started after the peak year of 1977, continued into the first part of 1982, then reversed and, with erratic monthly production, ended the year with a production gain over that of 1981. Acid-grade material made the biggest gains. The value of production increased each year between 1976 and 1982 because of increasing prices. The main cause of the decline in production was the state of the economy in consuming countries, particularly in Japan, which has traditionally been Thailand's main customer. Thailand also had increased competition from other producing countries, particularly acid-grade material from China. The reversal of the downward trend probably reflected the economic recovery in the industrial countries.

Thai fluorite prices have barely kept up with increased costs of production and transport, putting pressure on less efficient operators and those with lower grade ore bodies. The largely buyer-controlled pricing structure has not been conducive to industry expansion or exploration.

Some of the older fluorite mines were approaching depletion, but few new deposits were being developed or examined. A major increase in exploration and deposit development will be needed to sustain significant production increases beyond the next few years, and certainly past the end of the decade.

In order to offset the decline in exports to Japan, Thailand has been courting other consumers. The U.S.S.R. was its second largest customer for metallurgical-grade fluorite in 1981 followed by the Republic of Korea and Taiwan. The U.S.S.R. became Thailand's biggest market for acid-grade fluorite for the first time in 1981. Japan had

held that position prior to 1976.

Despite Thailand's large production, ranking eighth in the world, it still must import fluorine chemicals in the absence of a downstream chemical industry. Because of this the Thai Government began promoting, in 1982, the establishment of a hydrofluoric acid and fluorine chemical industry for domestic consumption and the export market. Special economic privileges would be granted to a company wishing to undertake the project. Some of the major conditions were that (1) the minimum production capacity must satisfy domestic consumption and its projected growth for the next 5 years, (2) Thai nationals must hold not less than 51% of the registered capital after the plant has been in operation for 5 years, and (3) the Government would not license a similar industry for 5 years. It was believed that some domestic companies were looking into the offer.[19]

Salt.—The plans for an ASEAN-backed salt mine and soda ash plant moved another small step forward during the year when shareholders from the five countries signed a joint-venture agreement creating the ASEAN Soda Ash Co. The project was formally accepted as an ASEAN project in 1978 and plans have progressed slowly since then. The delays have increased the proposed cost of the project from $230 million to over $377 million.

According to the plan, at least 600,000 tons of salt per year would be mined in northeast Thailand where some of the largest salt reserves in the world underlie the Khorat Plateau. The salt would be moved by rail to a soda ash plant on the southeast coast, which would produce 400,000 tons per year each of soda ash and ammonium chloride.

Although formation of the company was encouraging progress, a number of factors still had not been settled at yearend. The plant would be directly dependent on natural gas for process heating and indirectly dependent on low-cost electric power. In addition, the ideal situation was for the proposed ammonia-urea fertilizer plant to furnish ammonia to the project. If the ammonia plant is not built then ammonia would be imported from Indonesia, probably at a higher price. The delivered cost of the natural gas and ammonia will be critical to the economic viability of the project.

MINERAL FUELS

Petroleum and Natural Gas.—Twelve private groups hold the major concession blocks laid out both onshore and offshore by DMR. Exploration has been intense during the last few years. As of November, 107 wells had been drilled offshore. The results showed natural gas and condensate in 55 wells, crude oil and natural gas in 4 wells, and crude oil in 2 others. DMR stated that the gas reserves were over 16 trillion cubic feet. Some of the participating companies considered this figure to be sanguine but whatever the realistic total turns out to be, it is apparent that the exploration activities have been very successful. The only disappointment was the failure to find commercial crude oil deposits offshore. Condensate output, however, will become more important as gas production increases in the coming years.

In addition to the offshore gas reserves announced, there were four additional gasfields deemed to be of commercial size for which no reserve estimates were available at yearend. They were the North Pla-dang, Funan, Trat, and Parkarang Gasfields, all in Union Oil Co.'s concession.

Offshore exploration drilling during 1982 was conducted in the Gulf of Thailand by three of the concessionaires, Pecten Thailand Co., Union Oil of Thailand, and Texas Pacific (Thailand) Inc. Of the six wells started, one tested gas and condensate, two were being drilled at yearend, and three were dry holes. Boundary disputes with Kampuchea and Malaysia temporarily prevented exploration by Triton Oil Co. of Thailand, Thailand Sun Oil Co., and AMOCO Thailand Petroleum Co.

Previous surveys and drilling in the Andaman Sea produced no commerical discoveries and the previous concessions have been relinquished.

Onshore exploration was successful in 1982. Thai-Shell completed a well started in 1981 that tested favorable amounts of crude oil. Thai-Shell also started seven wells in 1982, three of which tested oil, three were dry holes, and one was being drilled at yearend. The Thai-Shell discoveries were encouraging enough for the company to announce its intention to begin crude production of 5,000 barrels per day early in 1983. The field is north of Bangkok at Amphoe Lan Krabu, Kamphaeng Phet Province. This will be the first commerical crude oil production in Thailand; a small Government-owned field near Fang in northern Thailand has produced a few hundred barrels of crude oil per day for Thai military forces for many years. Thai-Shell's estimated cost of production reportedly would be about $25.50 per barrel.

Esso Exploration and Production Khorat

Inc. drilled three wells on concessions covering 50,000 square kilometers on the Khorat Plateau in northeastern Thailand. The first was in Namphong district, 27 kilometers north of Khon Khaen. It tested 47 million cubic feet of dry natural gas per day from zones below 3,100 meters. The second well, 100 kilometers south of the first well, encountered extreme pressure at 3,600 meters. Drilling was suspended and the hole was cemented until high-pressure equipment could be obtained to safely complete the well. Esso's third well in Chiayaphoom Province was suspended after finding no petroleum at a depth of 2,350 meters. Because the results of the first wells were encouraging, the geologic structure will be further tested.

The start of natural gas production from the offshore Erawan Gasfield late in 1981 inaugurated an era of industrial expansion along the eastern seaboard, southeast of Bangkok. Unfortunately, initial gas production was much lower than projected and by mid-1982 it was apparent that production would not only be lower than projected but would not be available in the timeframe originally set up. The field produced 120 million cubic feet per day instead of the contracted amount of 250 million cubic feet per day. The cause of the shortfall, inadequate reserves and/or unexpected geological problems, was still under study at yearend. The major concern of Union Oil and the Petroleum Authority of Thailand was getting gas production up to the contracted flow rate as soon as possible.

The Petroleum Authority did not meet commitments to its first two customers, the Electricity Generating Authority of Thailand and Siam Cement, because of the gasfield's inadequate production. The Petroleum Authority counted on these gas revenues to pay for the $500 million pipeline to Bangkok.[20]

As a partial solution to the production problem, Union Oil will drill additional wells to increase gas flow. In addition, Union Oil's concessions have other proven gasfields with reserves totaling 7 trillion cubic feet. Union has proposed accelerated development of one of these, the Banphot Field, to supplement the Erawan gas. The Banphot Field was believed capable of producing 40 million cubic feet per day. A branch pipeline would tie the Banphot Field to the main pipeline.

A critical part of the long-term development of the natural gas resources was construction of a gas separation plant. The plant, to be located at Laem Chabang, northwest of Rayong, would produce ethane, propane, butane, natural gasoline, and liquefied petroleum gas from the wet natural gas. After nearly 2 years of planning, bidding, and negotiating, a $180 million contract was awarded late in 1982. A consortium composed of Toyo Engineering Corp., Mitsui, and C. E. Randal Corp. will build the 350-million-cubic-foot-per-day, first-stage facility on a turnkey basis. A second stage will be built when additional offshore fields are brought into production. Output from the separation plant will be used to feed a planned $870 million petrochemical complex.

Price negotiations for Texas Pacific (Thailand) Inc.'s natural gas discoveries in concessions south of the Erawan Gasfield continued. An agreeable price was not found so Texas Pacific sought permission to export the gas. This was apparently obtained early in the year. Later, in a move that surprised Texas Pacific, the Government set up a Thai-owned company to export LNG from the Texas Pacific concession. The new arrangement took controlling interest in the project from Texas Pacific and apparently remained unchanged at yearend.

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[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Thai baht (B) to U.S. dollars at the rate of B23.0=US$1.00.
[3]U.S. Embassy, Manila, Philippines. Department of State Telegram A-07748, dated 0301025Z March 1983, p. 1.
[4]U.S. Embassy, Bangkok, Thailand. Summary of Economic Trends Report. Department of State Telegram A-16509, dated R111028Z April 1983, p. 1.
[5]Metric tons (2,204.6 pounds) are used throughout this report.
[6]Mining Journal (London). V. 300, No. 7690, Jan. 7, 1983, p. 3.
[7]Business in Thailand (Bangkok). V. 14, No. 3, March 1983, p. 58.
[8]Metal Bulletin Monthly. No. 141, September 1982, p. 107.
[9]Kinney, G. L. The Mineral Industry of Thailand. BuMines Minerals Yearbook 1981, v. 3, p. 12.
[10]Mining Magazine. V. 148, No. 1, January 1983, p. 12.
[11]Mining Journal (London). V. 299, No. 7677, Oct. 8, 1982, p. 258.
[12]Asian Wall Street Journal. V. 6, No. 205, June 18, 1982, p. 3.
[13]Engineering and Mining Journal. V. 183, No. 12, December 1982, p. 35.
[14]Business in Thailand (Bangkok). V. 14, No. 2, February 1983, p. 15.
[15]Asian Wall Street Journal. V. 6, No. 226, July 19, 1982, p. 3.
[16]———. V. 7, No 34, Oct. 18, 1982, p. 3.
[17]Phosphorus & Potassium. No. 118, March-April 1982, pp. 29-34.
[18]———. No. 123, January-February 1983, p. 15.
[19]Industrial Minerals. No. 179, August 1982, p. 52.
Business Review (Bangkok). V. 1, No. 2, March 1983, p. 71.
[20]Financial Times. Dec. 1, 1982, p. 12.

The Mineral Industry of Tunisia

By Kevin Connor[1]

Valued at approximately 20% of the gross domestic product (GDP) in 1981, Tunisia's mineral production declined to approximately 18% of the country's GDP in 1982, which was estimated at slightly over $8 billion.[2] The substantial decrease was due to reductions in petroleum and phosphate rock production. Total mineral export receipts were down more than 20% from 1981. One-half of this decrease was attributable to an increase in use of petroleum production for domestic requirements, which in turn decreased petroleum import requirements and costs. The year 1982 was the first year of Tunisia's Sixth Development Plan (1982-86) and a time of stagnant economic growth. The GDP grew by only 1.5% in real terms in 1982, and the inflation rate increased to nearly 14%. External factors of world recession, severe weather, and soft markets were all key factors in the downturn of the Tunisian economy, which had averaged a 6% annual growth rate for the previous Fifth Development Plan years (1977-81). Petroleum production, Tunisia's major export commodity, was down by almost 5% for the year. Total exports were down by over 6% as the increases in manufactured goods shipped were overshadowed by the declines in petroleum, phosphate chemical, and food exports. Import prices continued to rise throughout the year and only through austerity measures was the growth in annual import costs kept slightly under 3.5%.

PRODUCTION AND TRADE

The decline in petroleum production in 1982 was due solely to the temporary shutdown of production equipment in the Ashtart offshore field for installation of gas lifting and collection systems. The decrease in Ashtart's annual production, which was 18% of 1981's total figure, more than offset the unexpected increase from the El Borma onshore petroleum field. The associated natural gas from the Ashtart Field was slated for use in the domestic market starting in 1983. Instability in the petroleum and refined product markets was cause in 1982 for a considerable rearrangement of Tunisian exports and imports of these commodities. To take advantage of lower prices elsewhere, Tunisia imported more refined products, reduced domestic refining, and used more domestically produced crude in refining to replace decreased light crude imports. Therefore, although total petroleum exports for the year were down 12% by volume, the increased use of indigenous production and decrease in energy import costs resulted in an overall 3% increase in petroleum revenues for the year.[3]

The mining sector experienced a significant decline overall for the year. Phosphate rock production was down 9%, and the subsequent phosphate chemical fertilizer industry production was down 15%, owing principally to the decreased demand and depressed prices on the world markets. Tunisia's iron ore production was down 31% for the year because of a major shutdown of the El Fouladh steel mill for maintenance and modernization work. Production of lead concentrate was down 12% and refined lead was off 13%, owing to very competitive market conditions, both domestically and internationally. Also, the lead smelting plants of Société Tunisienne d'Expansion Minère (STEM) were in need of renovation and had been operating ineffi-

ciently.

There was a 4.5% increase in zinc concentrate production, a 5% decrease in fluorspar production, and a 24% increase in barite production during 1982. However, these increases were not of sufficient value to overcome the decreases in the other mineral sectors.

Foreign trade in the minerals sector was generally poor throughout the year owing to the world oil glut and depressed agricultural markets for phosphate chemical fertilizers. Barite sales were a notable exception, increasing throughout the year as Tunisia continued to supply a larger share of the domestic and international market. The European Economic Community continued as the country's major trading partner with 54% of Tunisia's total exports for 1982 shipped to these countries. France, Italy, and the Federal Republic of Germany were the major export recipients with the United States a less significant fourth.

Table 1.—Tunisia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[p]
METALS					
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	339	394	389	396	275
Metal:					
Pig iron do	134	150	151	160	e150
Steel, crude do	159	176	178	178	e170
Lead:					
Mine output, metal content	8,009	10,021	8,310	5,661	4,988
Metal:					
Primary[3]	16,074	16,163	19,195	17,530	15,320
Secondary[e]	500	600	600	500	e500
Total	16,574	16,763	19,795	18,030	e15,820
Silver metal, primary thousand troy ounces	281	231	235	84	115
Zinc, mine output, metal content	7,392	8,706	7,579	7,458	7,088
NONMETALS					
Barite	16,358	r14,929	26,949	24,671	30,654
Cement, hydraulic thousand tons	882	1,383	1,780	2,020	e2,000
Clays, construction do	210	280	300	352	e350
Fluorspar, chemical- and metallurgical-grade	33,258	33,808	39,451	34,844	33,209
Gypsum	40,000	60,000	e75,000	e75,000	e75,000
Lime, hydraulic thousand tons	427	430	529	466	e500
Phosphate rock, gross weight do	3,712	4,154	4,582	4,596	4,196
Salt, marine do	425	400	437	467	421
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	24,438	e28,000	e28,000	e28,000	e28,000
Marketed do	9,390	11,657	12,700	13,703	14,883
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	36,500	42,679	43,100	41,600	39,324
Refinery products:					
Gasoline do	1,270	1,292	1,085	1,391	1,498
Kerosine do	1,267	1,777	1,684	1,837	2,277
Distillate fuel oil do	2,365	3,166	3,016	3,156	3,024
Residual fuel oil do	3,341	4,294	4,099	4,380	3,545
Other do	399	358	325	414	445
Refinery fuel and losses do	710	150	652	1,336	197
Total do	9,352	11,037	10,861	12,514	10,986

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through June 14, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (common clays, sand and gravel, and stone) is produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]From domestic and imported ores.

Table 2.—Tunisia: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	15	123	--	France 77; Belgium-Luxembourg 45.
Unwrought	133	109	--	Belgium-Luxembourg 84; France 25.
Semimanufactures	253	386	--	Algeria 385; Italy 1.
Copper: Metal including alloys:				
Scrap	832	1,525	--	Spain 680; Belgium-Luxembourg 437; West Germany 68.
Semimanufactures	r1	--		
Iron and steel: Metal:				
Scrap	791	1,717	--	Spain 1,665; Belgium-Luxembourg 52.
Pig iron, cast iron, related materials	197	17	--	All to Italy.
Semimanufactures:				
Bars, rods, angles, shapes, sections	15	2	(1)	Mainly to Italy.
Universals, plates, sheets	741	24	--	Libya 22; Italy 2.
Hoop and strip	1	2,905	--	Greece 2,899; France 5; Libya 1.
Wire	1,019	684	--	Mainly to Algeria.
Tubes, pipes, fittings	482	421	22	Algeria 346; Italy 27; France 16.
Castings and forgings, rough	(1)	1	--	All to Libya.
Unspecified	837	--		
Lead:				
Ore and concentrate	--	17	--	All to Libya.
Metal including alloys:				
Scrap	338	513	--	Denmark 349.
Unwrought	11,943	10,821	--	Algeria 5,614; Italy 5,200; Libya 7.
Semimanufactures	--	5	--	All to Libya.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$3,462	$1,209	--	All to France.
Tin: Metal including alloys, semimanufactures	4	1	--	All to West Germany.
Zinc:				
Ore and concentrate	20,309	17,073	--	France 12,653; Italy 3,115; Switzerland 1,305.
Oxides	330	--		
Metal including alloys, unwrought	1	--		
Other:				
Ores and concentrates	2	4,156	--	All to Italy.
Ashes and residues	398	538	--	Spain 249; West Germany 205; Belgium-Luxembourg 84.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	2	1	1	
Barite and witherite	2,840	1,040	--	All to Algeria.
Cement	4,300	7,260	--	Do.
Clays and clay products:				
Crude, unspecified	36	--		
Products:				
Nonrefractory	36	79,313	--	Libya 79,219; United Arab Emirates 3.
Refractory including nonclay brick	1,595	409	--	All to Algeria.
Diamond:				
Gem, not set or strung value, thousands	$1,979	$1,224	--	All to Belgium-Luxembourg.
Industrial thousand carats	145	--		
Feldspar, fluorspar, related materials:				
Fluorspar	6,025	--		
Fertilizer materials: Manufactured:				
Phosphatic	513,509	586,485	--	Algeria 85,995; France 71,711; Italy 52,275.
Unspecified and mixed	169,801	349,537	--	Iran 82,332; Algeria 22,898; Libya 16,210.
Gypsum and plaster kilograms	250	--		
Phosphates, crude thousand tons	1,317	1,062	--	Turkey 223; Poland 205; France 132.
Pigments, mineral: Iron oxides and hydroxides, processed	--	12	--	All to France.
Salt and brine	272,972	368,823	54,882	Italy 105,762; Yugoslavia 79,548; Norway 43,374.

See footnotes at end of table.

Table 2.—Tunisia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	10	--		
Worked	3	1	--	All to France.
Gravel and crushed rock	520	--		
Quartz and quartzite	(1)	61	--	Algeria 60.
Sand other than metal-bearing	30	31	--	Austria 19; Italy 9; France 3.
Sulfur:				
Elemental, colloidal, precipitated, sublimed kilograms	100	--		
Sulfuric acid	5,955	3,379	--	Algeria 2,001; Libya 1,378.
Talc, steatite, soapstone, pyrophyllite kilograms	26	--		
Other:				
Crude	1	68	--	West Germany 60; Libya 7; Netherlands 1.
Slag and dross, not metal-bearing	--	200	--	All to Algeria.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	18	2	--	All to Reunion.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black kilograms	66	--		
Hydrogen, helium, rare gases do	1	--		
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	36,435	38,479	12,722	Italy 11,579; Greece 5,469; France 4,875.
Refinery products:				
Gasoline do	r994	1,030	--	All to Switzerland.
Mineral jelly and wax value	--	$1,000	--	All to United Kingdom.
Kerosine and jet fuel 42-gallon barrels	r652,573	870,891	--	Bunkers 792,004; France 40,029; Greece 16,174.
Distillate fuel oil do	74,212	79,113	--	Bunkers 68,908; Honduras 149; Panama 90.
Lubricants do	948	10,787	--	Libya 9,996; Bunkers 707.
Nonlubricating oils do	231			
Residual fuel oil do	26,493	89,857	--	Bunkers 89,078; Libya 719.
Bituminous mixtures do	49	--		

rRevised.
1Less than 1/2 unit.

Table 3.—Tunisia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified	1	10	--	Mainly from Bulgaria.
Aluminum:				
Oxides and hydroxides	23,160	20,460	--	Italy 10,340; France 9,868; Netherlands 20.
Metal including alloys:				
Unwrought	236	1,555	--	France 703; Spain 592; Canada 200.
Semimanufactures	3,553	4,982	1	France 2,457; Italy 1,226; Belgium-Luxembourg 337.
Chromium:				
Ore and concentrate	2	65	--	Netherlands 60; Belgium-Luxembourg 5.
Oxides and hydroxides	36	20	--	West Germany 18; France 1.
Cobalt: Oxides and hydroxides kilograms	823	--		
Copper:				
Matte and speiss including cement copper	62	82	--	All from Italy.
Oxides and hydroxides	31	--		
Sulfate	237	--		

Table 3.—Tunisia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Copper —Continued				
Metal including alloys:				
Unwrought	r37	199	--	Italy 165; France 34.
Semimanufactures	r5,756	4,828	1	France 4,248; Belgium-Luxembourg 144; West Germany 138.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	11,402	11,665	--	Mauritania 11,658; West Germany 7.
Metal:				
Scrap	49	992	--	United Kingdom 990.
Pig iron, cast iron, related materials	r3,372	8,411	--	Algeria 5,173; France 982; Yugoslavia 925.
Steel, primary forms	r163	10,116	--	West Germany 10,092; France 16.
Semimanufactures:				
Bars, rods, angles, shapes, sections	92,113	128,476	(1)	Spain 38,612; Greece 29,919; France 20,300.
Universals, plates, sheets	86,732	68,543	76	France 28,590; Italy 12,774; West Germany 12,192.
Hoop and strip	18,326	2,828	48	France 1,594; Italy 968; West Germany 77.
Rails and accessories	29,937	22,489	--	France 22,161; Belgium-Luxembourg 152; Italy 75.
Wire	1,793	3,122	18	France 1,391; Italy 651; West Germany 430.
Tubes, pipes, fittings	119,603	75,283	2,437	France 19,175; West Germany 18,391; Italy 13,398.
Castings and forgings, rough	215	29	--	West Germany 15; France 12; Italy 2.
Unspecified	9,298	--		
Lead:				
Ore and concentrate	9,985	19,400	--	Morocco 16,850; Algeria 2,550.
Oxides	203	90	--	France 85; West Germany 5.
Metal including alloys:				
Unwrought	68	581	NA	NA.
Semimanufactures	7	35	--	All from France.
Magnesium: Metal including alloys, semimanufactures	11	2	--	Mainly from Italy.
Manganese: Oxides	2	9	--	Belgium-Luxembourg 8; France 1.
Mercury 76-pound flasks	5	203	(1)	Mainly from Algeria.
Metalloids: Unspecified	10	3	(1)	Italy 2; France 1.
Molybdenum: Metal including alloys, all forms value, thousands	$13	$30	--	Austria $13; Sweden $11; France $3.
Nickel:				
Matte and speiss	1	--		
Metal including alloys, semimanufactures	33	25	--	France 12; United Kingdom 8; Italy 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1	$4	--	France $3; West Germany $1.
Silver: Metal including alloys, unwrought and partly wrought do	$52	$148	--	West Germany $48; Switzerland $39; Italy $31.
Tin:				
Oxides kilograms	270	--		
Metal including alloys:				
Scrap	--	1	--	All from France.
Unwrought	92	31	--	Indonesia 12; Thailand 10; Belgium-Luxembourg 4.
Semimanufactures	28	17	--	France 8; West Germany 7.
Titanium: Oxides	139	123	(1)	West Germany 62; Belgium-Luxembourg 61.
Tungsten: Metal including alloys, all forms value, thousands	$85	$43	--	All from France.
Uranium and/or thorium: Oxides and other compounds kilograms	3,362	NA		
Vanadium: Oxides and hydroxides	38	--		

See footnotes at end of table.

Table 3.—Tunisia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	--	5	--	All from France.
Oxides	249	194	--	France 159; West Germany 24.
Metal including alloys:				
Scrap value, thousands	--	$1	--	All from West Germany.
Unwrought	1,531	871	--	Spain 395; Algeria 207; Netherlands 100.
Semimanufactures	52	51	--	France 50.
Other:				
Ores and concentrates	246	90	--	Italy 85; West Germany 3.
Oxides and hydroxides	39	--		
Base metals including alloys, unwrought and semimanufactures	49	65	--	Spain 39; Netherlands 15; France 10.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	220	129	--	France 92; Italy 34; United Kingdom 3.
Artificial: Corundum	72	75	--	France 31; Spain 30; Italy 12.
Dust and powder of precious and semi-precious stones value, thousands	$5	$1	--	All from Belgium-Luxembourg.
Grinding and polishing wheels and stones	530	400	(1)	Italy 290; France 65; Austria 14.
Asbestos, crude	5,838	8,397	19	Canada 5,507; Mozambique 1,200; U.S.S.R. 746.
Barite and witherite	233	103	--	France 68; West Germany 35.
Boron materials:				
Crude natural borates kilograms	7	--		
Oxides and acids	157	197	--	France 122; West Germany 55; Netherlands 20.
Cement	323,207	138,407	--	Yugoslavia 62,299; France 36,797; Spain 11,000.
Chalk	703	2,320	--	France 1,220; Italy 1,100.
Clays and clay products:				
Crude, unspecified	18,530	23,552	2	Italy 9,699; Spain 5,910; Morocco 2,266.
Products:				
Nonrefractory	13,120	14,509	--	Spain 10,242; Italy 2,528; France 911.
Refractory including nonclay brick	7,624	9,648	(1)	West Germany 3,850; France 3,490; Italy 662.
Diamond:				
Gem, not set or strung value, thousands	$2,328	$1,851	--	All from Belgium-Luxembourg.
Industrial thousand carats	365	NA		
Diatomite and other infusorial earth	150	156	31	France 105; United Kingdom 20.
Feldspar, fluorspar, related materials	1,871	12,560	--	Spain 4,726; France 1,545; Italy 1,365.
Fertilizer materials:				
Crude, unspecified	--	4	--	All from France.
Manufactured:				
Ammonia	59,869	75,109	11,000	U.S.S.R. 33,519; United Kingdom 10,023; Kuwait 7,983.
Nitrogenous	66,602	101,494	--	Netherlands 31,409; France 23,827; Bulgaria 15,672.
Phosphatic kilograms	54	--		
Potassic	15,112	5,638	--	Italy 5,600; France 18.
Unspecified and mixed	70	870	NA	NA.
Graphite, natural	2	4	--	France 3.
Gypsum and plaster	474	141	--	France 123; West Germany 10.
Halogens:				
Chlorine	425	909	--	France 558; Algeria 322; West Germany 29.
Unspecified	1	2	--	West Germany 1; Switzerland 1.
Lime	72	17	--	All from France.
Magnesium compounds: Magnesite	63	102	--	West Germany 40; Yugoslavia 30; Netherlands 19.

See footnotes at end of table.

Table 3.—Tunisia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Mica:				
Crude including splittings and waste	103	107	66	United Kingdom 40; France 1.
Worked including agglomerated splittings	8	7	--	Mainly from France.
Phosphates, crude — value, thousands	$1	$1	--	All from France.
Pigments, mineral: Iron oxides and hydroxides, processed	280	266	11	West Germany 178; France 38; Italy 23.
Potassium salts, crude				
value, thousands	--	$1	--	All from France.
Precious and semiprecious stones other than diamond: Natural carats	10,000	--		
Salt and brine	22	22	--	France 11; West Germany 7.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	18	25	--	France 13; Sweden 4; West Germany 3.
Sodium carbonate, manufactured	39,086	5,117	--	France 3,981; Bulgaria 650; Poland 180.
Sodium hydroxide	13,587	9,646	134	France 6,919; East Germany 771; West Germany 654.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	11,979	13,332	--	Italy 13,322; France 10.
Worked	94	202	--	Mainly from Italy.
Dolomite, chiefly refractory-grade	315	637	--	France 443; Spain 100; Italy 94.
Gravel and crushed rock	21,377	20,985	--	Italy 20,485; Netherlands 500.
Quartz and quartzite	524	1,125	--	Belgium-Luxembourg 1,078; Italy 22; France 20.
Sand other than metal-bearing	832	938	--	Netherlands 600; Belgium-Luxembourg 300; France 30.
Sulfur:				
Elemental, crude including native and byproduct	678,489	836,700	--	Canada 471,849; Poland 178,631; France 171,753.
Sulfuric acid	3,318	8,917	--	United Kingdom 3,000; West Germany 2,638.
Talc, steatite, soapstone, pyrophyllite	1,875	1,928	--	France 1,660; Spain 255.
Other:				
Crude	52	65	(1)	Mainly from France.
Slag and dross, not metal-bearing	(1)	--		
Oxides and hydroxides of barium, magnesium, strontium	16	15	--	Mainly from Netherlands.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	14,321	7,141	--	Morocco 4,606; Italy 2,479; France 56.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,207	92	--	All from Hungary.
Carbon: Carbon black	299	335	4	Italy 135; West Germany 104; France 92.
Coal: All grades excluding briquets	21,006	26,436	--	France 13,761; Morocco 9,376; Poland 3,299.
Coke and semicoke	75,011	102,669	--	West Germany 54,830; Italy 47,839.
Hydrogen, helium, rare gases	39	NA		
Peat including briquets and litter	50	7	--	All from France.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	8,411	11,167	--	All from Saudi Arabia.
Refinery products:				
Liquefied petroleum gas do	325	976	--	Greece 342; Libya 270; Italy 173.
Gasoline do	(1)	6	NA	NA.
Mineral jelly and wax do	7	8	--	France 6; Spain 2.
Kerosine and jet fuel do	1,134	1,318	--	Italy 823; Greece 354; Netherlands 111.
Distillate fuel oil do	2,730	4,177	--	Italy 2,433; Greece 1,290; U.S.S.R. 351.

See footnotes at end of table.

Table 3.—Tunisia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Lubricants				
thousand 42-gallon barrels	218	32	(1)	France 22; Italy 6; West Germany 2.
Residual fuel oil do	1,111	3,620	(1)	Greece 1,386; Italy 1,112.
Bitumen and other residues do	195	160	--	Italy 156; Hungary 2.
Bituminous mixtures do	5	3	--	France 2.
Unspecified do	14	--		
Tars and other crude chemicals derived from coal, gas, and petroleum	547	91	6	West Germany 15; France 14; U.S.S.R. 1.

rRevised. NA Not available.
1Less than 1/2 unit.

COMMODITY REVIEW

METALS

Iron and Steel.—In the second half of 1982, the El Fouladh steel production works temporarily shut down for maintenance and modernization work to improve the efficiency of the plant and expand its output. The blast furnace was refitted with higher performance equipment, adding to its capacity by 500 tons of steel per day. The improvements and modernization approximately doubled the plant's output. A second stage of alteration and expansion of plant converters and other plant equipment followed. The estimated $8 million project was scheduled for completion in early 1983. Also underway were $9.5 million in improvements in the steel fabrication works. Upgrading of the existing wire mill, installation of a second wire mill, installation of a new furnace for the existing bar mill, and upgrading of the existing drawing mill were all ongoing projects by late 1982. In addition, the construction of a new drawing mill was being contemplated to meet the increasing demand for hard-drawn steel products. The estimated cost for the new mill was $13 million, with a planned production capacity of 15,000 tons of finished product per year.

Lead and Zinc.—A project to modernize the Megrine lead smelter was being negotiated in 1982 between STEM and several West European and Canadian firms. Technical and cost proposals for both renovation of the existing works and construction of a new plant were being considered. Tunisia's production of both lead concentrate and metal were substantially down in 1982 because of serious plant smelting inefficiencies at the Megrine complex.

Other Metallic Minerals.—Tunisia produced a limited amount of silver and mercury for the domestic market. Silver was produced as a byproduct from the smelting of lead and zinc. A small amount of arsenic for domestic use was obtained from the Tabett Ben Ksouri deposits.

NONMETALS

Cement.—Société Tunisienne de Ciment Blanc continued work during the year on its 100,000-ton-per-year white cement plant, which was expected onstream in early 1984. Société Les Ciments Tunisians continued with construction on its new plant near Jebel Oust. The plant was scheduled for startup in late 1983 with a rated capacity of 1 million tons per year cement production. The consulting engineering firm for both projects was Lafarge Conseils et Etudes. Société des Industries Cimentieres du Centre projected an early 1983 startup for its new $125 million, 1-million-ton-per-year cement plant at Enfida. The plant was being erected by Kawasaki Heavy Industries of Japan in collaboration with Compenon Bernard of France for construction of

the projects' basic civil engineering works. Holderbank Management and Consulting Ltd. was the consulting engineer. An expected 120,000 tons per year of artificial lime was also to be produced at the plant. These projects, if completed on time, would double Tunisia's cement manufacturing capacity by 1984 to 4 million tons per year.

Fertilizer Materials.—Responding to weak world demand for fertilizer, Tunisia implemented a voluntary reduction in phosphate rock production of 9% from 1981's total of 4,596 metric tons. Although annual rock production decreased owing to the depressed market conditions, chemical fertilizer processing technology continued to expand within Tunisia. Industries Chimiques Maghrebines (ICM) began producing additional sulfuric and phosphoric acid in December 1982 from its newly constructed plant located within Gabés, the center of Tunisia's chemical fertilizer industry. Also scheduled for startup in Gabés in 1983 was the Société Arabe des Engrais Phosphates et Azotes new ammonium nitrate plant. The Tunisian agribusiness is expected to consume 40% of this plant's production, with the rest destined for export. In 1983, it was expected that 80% of Tunisia's phosphate rock production would be converted into chemical fertilizer products, with the range covering, triple superphosphate, three concentration grades of phosphoric acid, monoammonium and diammonium phosphate, bicalcium phosphate, trisodium polyphosphate, and ammonium nitrate. Other chemicals related to the manufacture of nutrient products for animals have also been produced.

Construction work by Industries Chimiques de Gafsa began in 1982 on a 400,000-ton-per-year triple superphosphate complex at M'Dilla, near Gafsa. The plant was expected to be completed by the end of 1984. Also to be built at the M'Dilla fertilizer complex was a 500,000-ton-per-year sulfuric acid plant and a 150,000-ton-per-year phosphoric acid plant, both by Société Industrielle d'Acide Phosphorique et d'Engrais.

To transport phosphate rock and products from the M'Dilla complex to Gabés for processing and export, a new railroad line was being built and had neared a first stage of completion at yearend 1982. By the spring of 1983, the line was expected to be partially operable, with total operational capacity expected for the fall of 1984. Also well into the planning stages was a phosphoric acid complex to be built at Skhira on the east coast 40 kilometers north of Gabés. Preliminary plans estimate a $150 million construction cost for the complex, which would include phosphoric and sulfuric acid plants, two seawater desalinization units, an electric generating station, and a 5-kilometer undersea pipeline.

In the mining area, a contract was awarded to Jacobs Engineering of the United States in November 1982 to conduct detailed engineering studies for the development of the Sra Quertane open pit phosphate mine in northwest Tunisia. The Sra Quertane Mine was one of four new operations, all open pit, which were scheduled for development in Tunisia during the 1980's. The other three mines were to be located in the Gafsa Basin where all except one of Tunisia's existing mines are located. The proposed mine locations were Jellabia Mzinaa, Kef Eddour, and Oum el Kecheb. Tunisia hoped to be producing 75% of its phosphate rock by open pit dragline methods by the mid-1990's with total production estimated at over 10 million tons per year. But with depressed market conditions expected at least through 1983, there was uncertainty about when these operations would be brought online.

Potassium.—Feasibility studies to develop the brine deposit at Sebkha el Melah near Zarsis on the southeast coast continued in 1982. Late in the year the French consortium of PEC Engineering, Mines de Potasse D'Alsace, and Spie Batignolles was awarded a contract to do a final feasibility and basic engineering plant design study for extracting potassium from the brine. The potassium extraction was proposed as the first of two stages for recovering minerals from the dry salt lake basin. A second stage of plant construction for extracting magnesium from the brine was also well into planning with both mineral extraction plants slated to be operational by 1987. The potassium extraction, planned at 100,000 tons per year K_2O, would be used both for the domestic and export fertilizer markets. Preliminary cost estimates for the first stage of construction were $22 million, and $92 million for the second stage.

MINERAL FUELS

Petroleum.—The major oilfields under exploitation in Tunisia produced slightly under 40 million barrels of crude petroleum in 1982, a 5% decline from the previous year's production and a 9% decline from the

peak output of 1980. The decrease in crude output was a result of a temporary shutdown in extraction from the Ashtart offshore oilfield. During the late 1970's and early 1980's Tunisia's oil and gas exploration and development efforts steadily increased, with an estimated $400 million invested during 1982. Since the Ashtart offshore oilfield went into production in 1974, Tunisia's exploration efforts have been focused in two offshore zones, the Gulf of Gabés and the Gulf of Hammamet. Major reserve discoveries during that time were the Tazeraka, Halk el Menzel, Isis, Miskar, Didon, and Gabés Ben Gardane Fields. The Tazeraka Field, discovered in 1978, went into production in November 1982 Tazeraka, a relatively small field with an estimated recoverable reserve base of 10 million barrels, was expected to produce approximately 2.5 million barrels per year. Because the field had been assessed to have a short production lifespan, exploitation was being carried out from a supertanker equipped with necessary facilities and installations, which was moored semipermanently over the oilfield.

In February 1982, the International Court of Justice made a ruling regarding the longstanding dispute over offshore territorial borders between Tunisia and Libya. The offshore oil and gas deposits of Didon, Miskar, and Isis were within the disputed territory. If the border indicated by the court in its ruling were to be agreed to and finalized by the two countries, then all three of the petroleum and gas finds would be within Tunisian domain. The Miskar Gasfield, first discovered by the French oil company Société Nationale Elf Aquitaine in 1975, was once again in 1982 determined by Elf to be too expensive to develop. The findings of this third major study of the Miskar gas deposit were released during the latter half of the year. The study showed that the large gas reserves estimated at 30 billion cubic meters were too deep, too high in hydrogen sulfide content, and too low in combustibles to be considered for the approximate $1 billion development costs at that time.

Onshore petroleum exploration efforts looked more profitable during 1982. The Sabria and Franig petroleum and gas discoveries of 1979 and 1980 were evaluated further and were found to have considerably larger reserves than originally estimated. Located in southwest Tunisia about 100 kilometers north of the El Borma Field, testing to determine flow levels at the Franig site were still underway late in 1982. An official decision to produce gas from the Franig Field had not been made as of yearend 1982, although the Government of Tunisia had expected to develop the gas deposits for domestic use. Natural gas production and usage were approximately equal in 1982 at 400 million cubic meters, but domestic demand was expected to increase steadily to 1.5 billion cubic meters per year by 1990.

Another onshore area where successful exploration drilling was conducted during the early 1980's was around the Sfax area. Houston Oil and Minerals Corp. had discovered two fields, the Gremda Field, northwest of Sfax, and the Thyna Field, which was southwest of the town. The commercial development potential of both fields was still undetermined at yearend 1982, with more wells and testing slated for the spring of 1983.

Technical and economic studies for the establishment of a pan-Arab export refinery at Cap Serat on the northwest coast of Tunisia should be completed early in 1983. Based on preliminary studies, the complex would refine up to 70 million barrels per year of crude oil, all of which would be exported. Construction work continued at Tunisia's existing refinery at Bizerte throughout 1982, with plans calling for expansion of the plant from its previous capacity of 11 million barrels to 42 million barrels per year of crude oil feedstock. The expanded refinery was expected to produce more than enough for Tunisia's annual consumption of petroleum products through the 1980's. Tunisia's petroleum consumption was approximately 20 million barrels in 1982.

Uranium.—Construction was well underway by yearend for Tunisia's first uranium recovery plant, being built in Gabés by Société Française d'Uranium Pechiney of France. The pilot plant, which was scheduled for completion in mid-1983, was designed to extract up to 120 tons per year of uranium oxide as byproduct of Tunisian phosphate rock. The plant was also expected to recover annually 35 tons of thorium and 20 tons of rare earths. ICM was expected to operate the plant.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Tunisian dinars (D) to U.S. dollars at a rate of D0.606=US$1.00.

[3]U.S. Embassy, Tunis, Tunisia. The Tunisian Economy, Performance and Prospects. State Department Telegram 2925, Apr. 13, 1983, p. 2.

The Mineral Industry of Turkey

By Peter J. Clarke[1]

While Turkey's economy continued to improve under the rigid guidelines of the economic stabilization program adopted in January 1980, the mineral sector has remained stagnant for the past 2 years as a result of both the weak level of world demand for primary minerals and continuing low productivity in the minerals industries. Reflecting a successful effort to spur industrial production, increase exports, and reduce its external debt, Turkey increased its gross national product (GNP) by 4.6% in 1982, which is among the highest GNP growth rates of all Organization for Economic Cooperation and Development (OECD) nations. Industrial production increased 5.5% in 1982 and agricultural output climbed 6.7% during this period. The growth in industrial exports has been most spectacular, however, increasing 50%. Turkey's GNP in 1982 was $53.8 billion,[2] its exports were $5.75 billion, 22% above those of 1981, its imports were $8.7 billion, down 2.2% from those of 1981, and its trade deficit shrunk to $2.9 billion from $4.2 billion in 1981.

Despite its impressive economic growth, the mineral sector did not keep pace during the year. Export revenues from minerals declined from $225 million in 1981 to $207 million in 1982, and the mineral sector's share of total exports declined from 4% in 1981 to 3.6% in 1982. There were significant declines in the production of boron and magnesite, two leading exports, while chromite, copper, and coal production all increased. Weak commodity prices for most minerals, however, resulted in lower export revenues even when production increased, as was the case with chromite. An indication of the unfavorable conditions in the minerals sector was the Government's unwilling takeover of Turkey's only specialty steel manufacturer, Asil Celik Sanayi ve Ticaret AS, owing to excessive foreign debt and unsold inventory.

Several important developments were on the horizon for Turkey's mining industry in 1982. First and foremost was the Government's continuing attempt to reform Law 2127, the Mine Nationalization Law, passed in 1978, that nationalized most boron, lignite, and iron ore mines. A new bill was awaiting passage by the Consultative Assembly that would retain all boron concessions for the Government mining company, Etibank, while returning most iron ore and lignite mines to their former private owners. At the same time, all uranium, thorium, and asphalt deposits would be reserved for Government exploitation. The Turkish National Security Council was also preparing final approval of a new petroleum law that was designed to remove private sector disincentives and encourage foreign investment in the petroleum sector. The law would basically codify a series of decrees issued since 1980 and allow foreign companies to export up to 35% of onshore and 45% of offshore oil production from all wells drilled since January 1, 1980. The law would also limit the number of licenses that the state-owned oil company, Turkiye Petrolleri Anonim Ortakliki (TPAO), can hold at one time, while increasing the number of licenses foreign or private companies can hold. Exploration and acreage fees were also increased considerably.

In combination with the new mining and petroleum laws, the Turkish Government carried out a substantial investment program in the mining sector that allowed for funding of 346 mineral-related projects in 1982. About 40% of the funding was foreign

exchange costs. To finance these costs, Etibank invited interested foreign companies to participate in several mining ventures, for which they would receive up to a 50% equity share. Of the projects available, only two have stimulated international interest; the Marmara Island marble quarrying project and the Rize-Cayeli copper project. In the latter project, Phelps Dodge Corp. of the United States, along with the private Turkish firm, Gama Industrie T.A.S., and Etibank were performing feasibility studies on a 30-million-ton deposit containing up to 3.3% copper and 10.2% zinc. Phelps Dodge was to hold a 49% equity share in the project once development begins. Other major Government investments involved modernization and expansion of Turkey's existing copper facilities, and a large-scale project to reduce energy consumption and increase production and capacity utilization in the country's fertilizer industry.

PRODUCTION

Mineral production in Turkey was stagnant in 1982, with productivity gains in a few commodities being offset by reductions in others. Most affected by the worldwide recession were boron, barite, and magnesite, three of Turkey's primary mineral exports. Magnesite took the steepest plunge, with output dropping almost 50%. Production of boron materials, which are the leading mineral exports, dropped 6% from that of 1981. Turkey retained its position, however, as the world's second largest producer of boron minerals, behind the United States. While chromite production managed to increase in 1982, exports of chromite actually decreased. Most of the private sector's chromite mining operations in Turkey operated sporadically or not at all during the year, owing to the low world market price for chrome concentrate. Etibank's chromite mines operated near capacity, producing chromite concentrate to meet contracts and to supply its two ferrochrome smelters at Antalya and Elazig. Turkey was the world's fifth largest producer of chromite and a minor producer of ferrochromium and ferrosilicon.

Production increases were registered in nitrogenous fertilizer, copper, asbestos, cement, and coal, but only fertilizer and coal had a significant impact on the domestic economy. Fertilizer production continued to respond to the Government's fertilizer rationalization and energy-saving project, which was intended to modernize, expand, and bring up to capacity most of the country's fertilizer plants. Production of hard coal and lignite continued to increase, reaching for the first time in 4 years the level of output attained prior to nationalization of the coal mines in 1978. Production may advance strongly over the next few years if the mines are returned to their former private owners. Copper production, which was the target of a large-scale Government investment program, increased to its highest level in several years in terms of mine output and refined copper. Smelter production, on the other hand, registered a 7% decline in 1982. Production of most other minerals remained at or near the same levels as that of 1981.

Table 1.—Turkey: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite	[r]422,854	[r]23,465	511,646	517,743	[2]415,639
Alumina	74,244	[r]75,143	137,508	131,400	[2]84,207
Metal	[r]32,288	[r]31,720	33,574	39,985	[2]36,520
Antimony:					
Ore, mine output:					
Gross weight	42,000	[e]37,800	43,000	27,934	[2]36,231
Metal content	2,100	1,890	2,153	838	950
Regulus	50	50	68	45	[2]144
Chromite:					
Gross weight (34% to 43% Cr_2O_3)	651,148	680,000	550,700	574,474	[2]621,716
Salable product[e]	375,000	450,000	400,000	422,550	460,000
Copper:					
Mine output, metal content	27,300	31,400	20,800	31,881	[2]34,430

See footnotes at end of table.

Table 1.—Turkey: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Copper —Continued					
Metal:					
Smelter	r26,184	r22,245	15,937	27,273	225,421
Refined	r16,201	r15,161	15,571	24,220	32,200
Iron and steel:					
Iron ore, gross weight thousand tons	3,208	e3,000	2,579	2,935	22,858
Metal:					
Pig iron and ferroalloys:					
Ferrochromium	e39,900	e30,000	e32,000	40,775	239,862
Pig iron and other ferroalloys thousand tons	1,827	2,228	2,040	1,954	22,379
Crude steel including casting do	2,172	2,396	2,536	2,363	2,795
Lead:					
Mine output, metal content[3]	9,500	7,500	6,700	8,042	5,510
Metal, smelter	3,000	5,900	6,500	4,800	4,800
Manganese ore, gross weight	68,184	41,584	41,634	14,937	5,520
Mercury 76-pound flasks	5,020	4,786	4,437	5,927	27,136
Silver, mine output, metal content thousand troy ounces	219	e250	e200	e200	200
Tungsten, metal content of concentrate	e7	56	96	153	150
Zinc:					
Mine output, metal content[4]	e40,700	r e24,100	e23,300	30,721	30,000
Metal, smelter, primary	r17,300	r17,200	12,600	18,100	14,400
NONMETALS					
Abrasives, natural: Emery	55,620	r47,914	39,940	45,824	235,164
Asbestos	13,372	r38,967	8,872	2,833	224,283
Barite	r100,904	100,005	127,241	185,555	107,367
Boron materials thousand tons	r866	r703	801	843	795
Cement, hydraulic do	15,344	13,784	12,875	15,043	215,778
Clays:					
Bentonite	8,280	e14,000	20,000	30,687	31,000
Kaolin	43,685	e59,000	50,000	44,795	45,000
Other	402,440	e300,000	110,000	150,942	2152,188
Diatomite	9,000	e9,000	9,500	e10,000	10,000
Feldspar	75,300	e72,600	72,000	e70,000	70,000
Fluorspar	1,253	6,200	6,000	1,986	2,000
Gypsum	60,332	e63,500	72,200	90,470	90,500
Magnesite, crude ore	417,201	r729,442	825,948	783,966	2397,202
Meerschaum kilograms	3,050	5,100	6,250	17,600	212,850
Nitrogen: N content of ammonia thousand tons	217	205	250	e410	2691
Perlite	26,861	30,000	25,800	45,000	2121,527
Phosphate rock	32,205	r e27,000	34,715	42,500	235,400
Pyrites, cuprous, gross weight	40,281	36,855	77,272	67,632	70,000
Salt, all types thousand tons	929	1,130	626	1,319	1,400
Sodium compounds, n.e.s.:					
Sodium carbonate[e]	65,000	70,000	60,000	60,000	60,000
Sodium sulfate	r26,568	r34,086	31,539	25,064	33,000
Stone, sand and gravel, n.e.s.:					
Limestone thousand tons	r e100	r e100	90	467	2338
Marble	122,000	r e35,000	15,871	36,823	224,110
Quartzite	243,210	e240,000	240,000	197,883	200,000
Sand, siliceous	67,307	e60,000	60,000	113,826	110,000
Strontium minerals: Celestite	17,500	18,000	16,000	e15,000	15,000
Sulfates, natural, n.e.s.: Aluminum sulfate (alunite)	e6,000	e6,000	6,000	11,543	11,500
Sulfur:					
Native, other than Frasch	r20,028	21,004	23,051	28,270	28,500
S content of pyrites	17,401	15,921	33,382	29,217	30,100
Byproduct	e80,000	70,000	70,000	120,000	2126,444
Total	r117,429	r106,925	126,433	177,487	185,044
MINERAL FUELS AND RELATED MATERIALS					
Asphalt, natural thousand tons	297	r1,059	559	560	2523
Carbon black	12,254	16,000	15,900	e18,108	219,922
Coal:					
Bituminous thousand tons	4,377	4,051	3,730	3,973	4,200
Lignite do	17,034	11,600	12,760	16,257	17,750
Coke and semicoke:					
Metallurgical do	1,690	2,625	1,928	1,875	22,102
Gashouse[e] do	270	300	300	250	300
Breeze[e] do	125	125	125	100	125
Total do	2,085	3,050	2,353	2,225	2,527

See footnotes at end of table.

Table 1.—Turkey: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Gas:					
Manufactured (from coal gas plants) million cubic feet	[e]4,800	NA	NA	NA	NA
Natural:					
Gross do.	36,500	36,000	30,000	[e]29,000	26,050
Marketed do.	794	1,200	1,000	[e]1,200	1,300
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	19,595	20,276	16,682	16,918	16,697
Refinery products:					
Gasoline do.	17,033	15,960	16,131	16,341	15,140
Jet fuel do.	1,367	1,460	1,165	1,716	2,360
Kerosine do.	4,474	3,429	3,682	2,386	2,035
Distillate fuel oil do.	[r]17,875	17,520	36,891	38,557	43,580
Residual fuel oil do.	[r]33,987	30,295	20,682	23,431	26,490
Lubricants do.	1,366	1,182	1,200	[e]1,000	1,100
Liquefied petroleum gas do.	4,241	4,229	4,324	3,742	3,430
Naphtha do.	131	139	114	210	210
Asphalt do.	2,615	1,972	1,615	2,177	1,875
Unspecified do.	2,672	3,500	3,547	3,814	4,480
Refinery fuel and losses do.	3,454	1,203	[e]1,200	[e]1,200	1,200
Total do.	[r]89,215	80,889	90,551	94,574	101,900

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through June 24, 1983.

[2]Reported figure.

[3]Includes Pb content of lead and lead-zinc ores but excludes Pb content of zinc ore.

[4]Includes Zn content of zinc and lead-zinc ores but excludes Zn content of lead ore.

TRADE

Turkey's revenues from mineral exports declined from $225 million in 1981 to $207 million in the current year. Mineral exports represented 3.6% of total exports, which amounted to $5.75 billion. Turkey's total exports increased markedly in 1982, up by 22% from the 1981 level, which meant that the mineral sector's share in overall trade declined. As in previous years, boron minerals and products were the leading export, as 460,000 tons was exported. Chromite ranked second with 280,000 tons of chromite ore and concentrate exported; 80% was from the private sector, the majority of which had been held in stocks from past years. Other leading exports were 190,000 tons of marble and 169,000 tons of barite from the private sector, and 88,000 tons of magnesite and 35,000 tons of ferrochrome from Etibank.

On the overall trade account, Turkey's total imports declined slightly from $8.9 billion in 1981 to $8.7 billion, owing mostly to lower prices paid for imported petroleum and also from lower fertilizer imports because of increased domestic production. Turkey paid $3.45 billion for crude oil imports, down from close to $4 billion in 1981. The growth in Turkey's exports was due to a 50% increase in industrial exports, which accounted for 60% of all exports in 1982. Close to 50% of Turkey's exports go to Islamic countries, with Iran being the largest market. The United States received 6% of Turkey's exports, valued at $252 million.

This growth in exports, combined with the 2% drop in imports, resulted in a 29% decline in the trade deficit, from $4.2 billion in 1981 to $3.0 billion in 1982. The current account deficit also shrunk substantially, owing to increased service receipts mainly from Turkish construction contracts overseas, from $2 billion in 1981 to $1 billion. Turkey registered a $118 million surplus in the basic balance, the first such surplus since 1973.

COMMODITY REVIEW

METALS

Aluminum.—Although Turkey possessed about 1.6% of the world's known bauxite reserves, the country remained a net importer of aluminum in 1982. Aluminum

consumption in Turkey was estimated at 75,000 tons per year, about one-half of which is produced domestically. Consumption was expected to exceed 100,000 tons per year by 1987, and even with planned capacity increases, Turkey was expected to remain a net importer of aluminum beyond the 1990's.

Etibank is the major bauxite producer, responsible for 97% of the country's output, with the private sector accounting for the remainder, and Etibank is the only producer of aluminum from the aluminum complex at Seydisehir. Bauxite for the complex is mined from a deposit near Seydisehir, which contained 41 million tons of measured reserves grading 57% Al_2O_3 and 8% SiO_2. Ore production from these mines ranged between 300,000 and 400,000 tons per year of bauxite. About 100,000 tons of refractory-grade diaspore ore is mined annually from a deposit at Milas, in Mugla Province, nearly all of which is directly exported. Turkey continued to export 80,000 tons per year of bauxite to the U.S.S.R. and other centrally planned economy countries as payment for the credit-loan under which the Soviets constructed the Seydisehir plant in 1973.

The Seydisehir plant is capable of treating 460,000 tons per year of bauxite to produce 120,000 tons per year of alumina and 60,000 tons per year of primary aluminum. Capacity utilization in 1982 averaged 60%. The plant was also equipped to produce a variety of semifinished products. Etibank, along with Turk Kablo, a Turkish Government-foreign partner joint venture, were capable of producing 32% of the country's total semifinished aluminum products, although capacity utilization at the two plants has seldom averaged above 45%. About 345 other private sector firms produce the bulk of Turkey's semifinished products. Nearly all of the aluminum plants in Turkey were found to be operating at 50% of their capacity in 1982, owing mostly to energy shortages.

Etibank, which also owns the Milas deposit, has invited any interested foreign companies to form a joint venture to build a second aluminum refinery based on the Milas deposit. The plan was to construct a 250,000-ton-per-year aluminum refinery and then possibly a 120,000-ton-per-year smelter and manufacturing plant. The refinery alone was to cost $265 million. As of 1982, no foreign partner had been found.

Chromite.—Turkish chromite production increased about 9%, mostly as a result of Etibank's increased output. Turkey ranked as the world's fifth largest producer of chromite, behind the Republic of South Africa, the U.S.S.R., Zimbabwe, and Finland, and supplied 4% of the world's total output. Turkey possessed about 3% of the world's total reserves of chromite, or 13 million tons of measured and 4 million tons of indicated reserves, and a total resource base of 36 million tons of chromite. Most of the ore reserves are metallurgical grade. The major chromite mining areas are at Guleman, Mugla-Fethiye, Orhaneli, and Adana, but chromite deposits have been located in all but 27 of the country's 67 Provinces.

Between 30% and 40% of Turkey's chromite production is generally supplied by Etibank from its mines around Mugla, Antalya, and Guleman, with the remainder being supplied by as many as 20 private sector companies. In times of depressed market conditions, as in 1981 and 1982, Etibank's share tends to rise as many private producers stop production. Etibank, which operates three concentrators at Karagedik, Kef Dagi, and Sark, with annual capacities of 30,000 tons, 75,000 tons, and 30,000 tons, respectively, also operates the country's only two ferrochrome smelters, at Antalya and Elazig. The company, which has the financial support of the Government, is able to maintain mine production during weak market periods because it uses the ore to produce ferrochrome, prices for which have held up better than for concentrate.

Most of the smaller private chromite producers were idle in 1982, as the world price for concentrate slipped below their operating cost. Six private companies operated eight chromite concentrators in Turkey: Egemetal Madencilik at Orhaneli and Mersin (10,000 tons per year each), Turk Maadin Sirketi AS at Kavak (75,000 tons per year), Kaycegiz Kromlari (10,000 tons per year), M. Kemal Dedeman at Pinarbasa and Burdar (10,000 tons per year each), Pinas at Karsanti (10,000 tons per year), and Sikti Kocman at Orhaneli (10,000 tons per year). Turk Maadin's Kavak Mine and concentrator was one of the few private sector operations running in 1982, as all mines in the Orhaneli and Mersin region were closed throughout the year.

Etibank's two ferrochrome smelters produced high- and low-carbon ferrochrome, primarily for export. The Antalya Ferro-

chrome Works produced 10,350 tons of low-carbon ferrochrome, 6,450 tons of silicon ferrochrome, 17,360 tons of calcium carbide, 4,300 tons of ferrosilicon, and 2,010 tons of Soderberg paste in 1982. Ferrosilicon was produced for the first time in 1982 through conversion of one of the older carbide furnaces. The Elazig Ferrochrome Works produced 29,516 tons of high-carbon ferrochrome in 1982, although capacity of the plant was 50,000 tons per year. High-carbon ferrochrome capacity was to be raised to 150,000 tons per year through a $33 million expansion project. Elkem AS of Norway was to provide engineering services, and Outokumpu Oy of Finland was to provide the process technology. Outokumpu was also planning to enter into a joint venture with Etibank to market Etibank's ferroalloys and other metals in Scandinavia. The new company would be called Etikumpu. Ultracrest and S.A. des Minerais currently market Etibank's minerals in other Western European countries.

Copper.—Turkey's copper industry continued to operate far below capacity in 1982, despite the Government's efforts to improve productivity and modernize many of the country's copper operations. Copper production in Turkey is centered around Ergani, Murgul, and the eastern coast of the Black Sea. Etibank and Karadeniz Bakir Isletmeleri (KBI), owned 49% by Etibank, accounted for about 98% of all copper ore production and 100% of all blister copper production. All smelter output is sold to domestically owned private sector refining companies, who sell the copper on the domestic market. Turkey's total measured and indicated reserves of copper ore are 125 million tons containing an average of 1.7% copper. Reserves at Turkey's currently operating deposits are 65 million tons containing 1.5% copper. The total resource base in the country was estimated at 315 million tons containing 0.3% copper. The only private sector copper ore producers are Bamas AS, Turk Maadin, and Demir Export Ltd., whose combined contribution to the industry is negligible. Turkey's copper industry is summarized in the following table.

Table 2.—Turkey: Copper industry in 1982

Operating company	Ownership	Location	Date established	Mine capacity (metric tons)	Mill capacity (metric tons)	Smelter capacity (metric tons)	Refinery capacity (metric tons)	Average capacity utilization (percent)
Etibank	Government	Ergani	1939	1,050,000	90,000	16,000	--	38
Do.	do.	Murgul	1951	487,000	65,000	12,000	--	50
Karadeniz Bakir Isletmeleri (KBI).	do.	do.	1973	2,970,000	208,000	--	--	60
Do.	do.	Samsun	1973	--	--	40,800	--	39
Do.	do.	Kure	1972	94,000	--	--	--	40
MKEK (Machinery and Chemicals).	do.	Ankara	1928	--	--	--	3,000	60
Bakirson Electrolytic Copper Ltd.	Private	Duzce	1981	--	--	--	20,000	10
Rabak Electrolytic Copper Ltd.	do.	Istanbul	1957	--	--	--	40,000	30
Sarkuysan Electrolytic Copper Ltd.	do.	do.	1975	--	--	--	40,000	25
Total				4,601,000	363,000	68,800	103,000	XX

XX Not applicable.

The low-capacity utilization figures are a result of several industrywide problems, including a decrease in the average ore grade, energy and labor force shortages, and severe bottlenecks in the production line. As a result, despite the country's potential to satisfy domestic needs of 65,000 tons of refined copper per year and still provide a surplus for export, Turkey imported about 30,000 tons of copper concentrate and about 5,000 tons of blister copper in 1982, along with 15,000 to 20,000 tons of refined and semimanufactured copper.

To solve the problems of the industry, both Etibank and KBI are embarking on large-scale modernization, expansion, and development projects. At Murgul and Samsun, KBI planned to modernize the mine, concentrator, and sulfuric acid plant, in order to increase ore-mining capacity to 3.8 million tons per year, raise concentrate production to 170,000 tons annually of 17% copper concentrates, raise production of pyrite concentrates containing 45% sulfur

from 15,000 tons to 133,000 tons per year, raise blister production to 33,700 tons per year, raise production of sulfuric acid from Samsun from 130,000 to 270,000 tons per year, and increase the metal recovery rate from 70% to 90%. Cost of the project is estimated at $40.6 million for Murgul and $12.5 million for Samsun. Also, KBI was constructing a new concentrator at Samsun to produce 29,000 tons per year of 12% copper concentrate, and 62,000 tons of pyrite concentrate containing 48% sulfur. The plant was to begin trial runs early in 1983.

Etibank's rehabilitation program at Murgul included raising ore capacity to 900,000 tons per year, raising concentrator output to 55,000 tons per year, and reaching 90% of rated blister capacity. Modernization at Ergani consisted of streamlining in order to reach rated capacity. Etibank also planned to start mining and concentrating copper at Kure-Asikoy. The project was to raise Kure's ore capacity to 1.1 million tons and also produce 105,000 tons per year of concentrate from a plant expected to be completed in 1985.

Meanwhile, KBI was constructing a new concentrator at Kutlular to treat 120,000 tons of ore and produce 16,360 tons per year of copper concentrate and 52,000 tons per year of pyrite concentrate. The project, called the Kutlular Mining Concentration Project, was to be completed in 1984.

At Ergani, Etibank operated an integrated mine-mill-smelter complex. Etibank's Damar and Cakmakkaya Mines at Murgul were operated by Etibank until 1973, when they were leased to KBI. KBI now supplies ore to Etibank's mill and smelter. That portion of the concentrate from Murgul not used in Etibank's smelter is shipped by sea to KBI's smelter at Samsun. Chalcopyrite ore from KBI's Bakibaba Mine in Kure provides the other main feed source for the smelter. Beginning in 1983, Kure ore will be concentrated in a new plant at Samsun before being charged to the smelter.

Perhaps the single most important development in the industry was the joint venture to develop the Rize-Cayeli copper deposit on the Black Sea coast near Samsun. Etibank, in a joint venture with Phelps Dodge, Gama Industrie, and Demir Export, were planning to produce 600,000 tons of ore, 62,000 tons of copper concentrate, and 206,000 tons of pyrite concentrate from the project, provided that feasibility studies proved encouraging. In October 1982, Phelps Dodge reported that its drilling program encountered 295 feet of massive copper sulfide ore containing 3.3% copper, 10.2% zinc, 0.038 ounce of gold per ton, and 1.93 ounces of silver per ton. Preliminary tests indicated reserves of about 30 million tons of ore.

Etibank was also requesting foreign assistance to begin development at the Sirt-Madenkoy copper project, designed to produce 600,000 tons of ore and 64,000 tons of copper concentrate.

Iron and Steel.—Turkey's iron and steel industry remained in the slump precipitated by the collapse of the domestic construction industry and the worldwide downturn in the iron and steel market. The public sector companies, Turkiye Demir ve Celik Isletmeleri (TDCI) or the Turkish Iron and Steel Works, and MKEK, the Government's engineering and chemical company that also controls several steel mills, continued to be plagued by production bottlenecks and inefficiency, while the many private sector producers were beset by the collapse of their export market, a high degree of foreign competition, especially Japanese, and a growing debt burden created by the recent devaluations in the Turkish lira.

Production of iron ore from TDCI's mines at Divrigi and elsewhere around the country declined slightly in 1982 to 2.86 million tons from 2.94 million tons in 1981. Despite its adequate reserves of 1.3 billion tons of iron ore, Turkey imported close to 1 million tons of ore and concentrate in 1981 and 1982. Iron ore production has remained low since 1978, prior to which the private sector iron mines supplied close to one-half of the country's output of 3.4 to 3.6 million tons.

The Turkish Government remained the country's largest steel producer, from its three main steelworks at Eregli, Iskenderun, and Karabuk, the latter two operated by TDCI, and the former operated by Eregli Demir ve Celik Fabrikalari T.A.S., or the Eregli Iron and Steel Works Association, which was also a Government-owned company. Crude annual steelmaking capacity at the three plants was 1.8 million tons, 1 million tons, and 600,000 tons, respectively. Eregli, built in 1960, and modernized by Nippon Kokan K.K. of Japan in 1973, was the only plant operating near capacity in 1982, while the other two suffered from outdated Soviet equipment, low productivity, and generally poor market conditions.

Turkey's private sector steel industry consisted of 9 medium-size steel producers along with several smaller ones, and about

150 steel-rolling operations. Combined capacity of the larger private sector steel producers was 1.27 million tons per year, bringing Turkey's total steelmaking capacity to 4.67 million tons per year, which means that overall, the industry operated below 60% capacity. An indication of the difficulty that the private sector was experiencing in 1982 was the Government's takeover of Asil Celik, the country's only specialty steel manufacturer. Asil Celik was brought onstream in late 1980, having been financed largely by external loans. The subsequent devaluation of Turkey's currency created a total debt of $55 million for the company, which could not pay the interest. The Government, through MKEK, took over in 1982 and began servicing the debt. Other problems faced by the industry were unusually high inventories and a wave of trade protectionism in Western Europe that helped to limit Turkey's export market. Turkey was negotiating with Iran at the end of 1982 to supply about 1.5 million tons of steel, valued at $325 per ton c.i.f. in a barter deal for crude oil, but no agreement was reached.

Tungsten.—Production from Etibank's Uludag tungsten mine, located 42 kilometers south of Bursa, remained low as the company continued to experience difficulties with maintaining the quality of the ore feed and operation of the concentrator. Ore was produced only from the underground mine, the open pit was closed in 1980 because more than enough ore was stockpiled outside the concentrator. The underground mine produced about 120,000 tons of ore in 1982, containing approximately 0.25% WO_3, primarily in scheelite, although some wolframite is produced as well. The deposit contains 9.4 million tons of measured ore reserves with an average grade of 0.35% WO_3 and another 4.9 million tons of indicated reserves.

The concentration process at Uludag was simple gravity separation by tabling. Etibank was developing a pilot flotation concentration plant to increase output from the mill, but results from this experimental project had yet to be applied to the main plant.

When the difficulties with the concentrator are corrected, Etibank planned to increase output from the plant by reopening the open pit to increase the ore feed. Operation at the pit had been contracted out to a Turkish company, Sevkit Uyanit, until 1980 when it closed. Etibank was planning to resume operations sometime in 1983 using its own personnel.

NONMETALS

Barite.—Turkish barite production responded to the downturn in the oil and drilling mud market with a 42% decline in production from the 1981 level. The decrease came at a time when Turkey was embarking on a large-scale expansion of its barite producing and grinding industry. The private sector was the leading producer, with Bastas Barytes Industry and Trading Co. Inc. accounting for the majority of the output with the recent addition of a new grinding mill at its plant in Antalya, raising its total grinding capacity to 240,000 tons per year. Baser Maden Sanayii ve Ticaret AS was also a large producer, with mine and grinding capacity of 60,000 tons and 80,000 tons per year, respectively, at Sarkikaraagic. Baser was considering installing a plant to produce minus 5-micrometer material by 1983. Matosan, a leading industrial mineral producer in Turkey, was acquired by the Altinyildiz Group, and its 150,000-ton-per-year marble grinding plant has been converted to produce about 50,000 to 75,000 tons per year of barite, along with kaolin, talc, and calcite.

Etibank was planning to enter the barite industry along with the major private producers by setting up a 100,000-ton-per-year mine and a 50,000-ton-per-year grinding plant. The mine would be located on deposits at Konya-Beysehir, and the mill at Antalya, nearby. Other barite producers in Turkey were Barit Maadin Turk AS in Marash and Adana, Polbar Baryte Industries AS in Alanya, Kimya Tesisleri Sanayi ve Ticaret AS in Kutahya and Kocaeli, and Emas Industrial Minerals AS in Mas.

Boron.—Despite the impact of the recession on the world's boron market, Turkey continued to press ahead with the expansion of its industry. Turkey possesses the world's largest known reserves of boron minerals, roughly 60% of the world total, and it was the world's largest exporter and second largest producer of boron minerals, behind the United States. Boron was mined from four major areas, at Kirka, Emet, Bigadic, and Kestelek, all in western Turkey. All of the mines have been operated by Etibank since the industry was nationalized in 1978.

Table 3.—Turkey: Boron mining industry in 1982

Deposit	Production capacity		Reserves		Average ore grade (percent)	Ore mineral
	Ore (thousand metric tons)	Concentrate (thousand metric tons)	Ore (thousand metric tons)	B_2O_3 (thousand metric tons)		
Kirka	450	300	500,000	125,000	26	Tincal.
Emet	800	400	500,000	300,000	44	Colemanite.
Bigadic	300	150	300,000	175,000	44	Colemanite-ulexite.
Kestelek	135	110			43	Do.
Total	1,685	960	1,300,000	600,000	XX	

XX Not applicable.

Production from all mines was well below capacity in 1982 owing to the weak market for boron minerals and compounds. Etibank's largest boron refining operation was located at Bandirma in northwest Turkey. Annual capacity of the plant was 35,000 tons of boric acid, 55,000 tons of borax decahydrate, 35,000 tons of borax pentahydrate, 20,000 tons of sodium perborate, and 120,000 tons of sulfuric acid. Etibank was constructing a new boric acid unit at Bandirma to raise total capacity to 135,000 tons per year by 1984. The new plant was also intended to produce 70,000 tons per year of borax decahydrate and 40,000 tons per year of borax pentahydrate. Raw boron material for the plant was supplied from the Emet and Bigadic Mines.

At Kirka, Etibank was constructing a large-scale chemical plant to produce boron compounds from sodium borate ore. The plant was to produce 160,000 tons per year of borax pentahydrate, 17,000 tons per year of borax decahydrate, and 60,000 tons per year of andydrous borax. The plant was to begin production late in 1983. Also under construction during the year was a major storage and loading terminal located about 40 kilometers south of the mine and plant. Eight storage tanks were built to store the boron compounds from the plant, along with tincal concentrate, before being loaded into rail cars from four separate platforms connected to the storage tanks by conveyor. The rail line led directly to the Mediterranean coast, from which most of the output will be exported.

Cement.—Turkey was in the process of expanding its cement production capacity from the current level of 20.1 million to 24.5 million tons per year by 1984. All of this growth was to come from new plants being built by Turkiye Cimento Sanayii T.A.S. (Cisan), the state-owned cement manufacturer. Cisan operated 17 cement plants in 1982, while 19 other plants were operated by the private sector. The private sector operations, which were generally of larger size than the public sector plants, have been responsible for about 70% of Turkey's cement production over the last 5 years. Also, capacity utilization in the private sector plants has been much higher, averaging 70% to 75% over the last 2 years, compared with 30% for the public sector.

Cisan was beginning to improve its performance in 1982 through construction of seven modern cement plants. Each of the new dry-process plants was to have a capacity of 1,750 tons per day. The plants, all being built by Cisan under the management supervision of Dyckerhoff Engineering GmbH of the Federal Republic of Germany, were located in Edirne, Denizli, Ladik, Ergani, Adiyaman, Urfa, and Siirt. The plants at Adiyaman and Siirt were expected onstream early in 1983 with the others commencing production before the end of 1984.

Fertilizer Materials.—Turkey entered the second phase of its fertilizer energy saving and rationalization project in 1982 following a 65% increase in nitrogen fertilizer production in 1981 and an additional 70% increase in 1982. Phosphate fertilizer production, however, declined about 5%, but large-scale modernization and capacity increases in the industry should raise phosphate fertilizer production over the next several years. The fertilizer project began in 1980 with a $110 million International Bank for Reconstruction and Development (World Bank) loan that was to be used for plant modifications and additions, increases in capacity utilization, improvements in energy efficiency, and reduction in pollution.

The first phase of the project, which was completed in 1982, involved modernization and expansion of the Bandirma Gubre Fabrikalari AS (BAGFAS) plant located at Bandirma. The expansion project involved commissioning a new 145,000-ton-per-year phosphoric acid plant, a 15,000-ton-per-year diammonium phosphate (DAP) plant, and a

150,000-ton-per-year compound fertilizer unit. Despite its modernization and expansion, Iskur, the industry union, was threatening to close the plant late in 1982 owing to its accumulated debt and excessive interest payments brought about by the large devaluations of the Turkish lira.

In 1982, the World Bank granted Turkey $44 million in additional loans to support the second phase of the project. A major portion of the loan was to be used to modernize the 650-ton-per-day sulfuric acid plant, the 215-ton-per-day phosphoric acid plant, and the 450-ton-per-day DAP plant at the Akdeniz Gubre Sanayii AS fertilizing facility at Mersin. A new 600-ton-per-day ammonium sulfate unit was also to be installed. In Iskenderun, Gubre Fabrikalari planned to modernize its sulfuric and phosphoric acid plants, and to install a new 600-ton-per-day DAP plant and an ammonium sulfate unit. Ege Gubre was to use a portion of the World Bank loan to modernize its 960-ton-per-day monoammonium phosphate plant at Foca. Finally, KBI, the copper producer, was to rehabilitate its 1,000-ton-per-day sulfuric acid plant at Samsun, which utilizes pyrite produced in association with copper ore in the production of sulfuric acid.

Azot Sanayii T.A.S., the Government-owned fertilizer producer, has finalized its plans to construct a $1.5 billion phosphate fertilizer complex at Iskenderun. Azot Sanayii operates several other fertilizer plants including phosphate fertilizer facilities at Samsun, and ammonia production facilities at Kutahya.

Azot Sanayii was negotiating with the Kuwait Petrochemical Industries Co. (PIC) and the Tunisian fertilizer consortium Industries Chimiques Maghrebines (ICM), itself part owned by PIC, for construction of Turkey's fourth integrated fertilizer complex. Azot was to hold 40% equity in the project, with PIC and ICM holding the remaining 60%. The plan was to produce 1,400 tons per day of DAP and 1,500 tons per day of ammonium nitrite, most likely based on Kuwaiti ammonia and Tunisian phosphate. Mersin was considered to be the most probable site for the project, which was estimated to cost between $350 million and $500 million. The initial timetable scheduled completion of the plant for 1986.

MINERAL FUELS

Turkey's continuing energy crisis eased somewhat in 1982, mostly as a result of lower prices for imported crude oil, but also assisted by the Government's determination to use its plentiful domestic resources of lignite and hydropower to supplant costly imported oil. Turkey's total electric power production amounted to 27.36 billion kilowatt-hours, 24% of which was supplied by lignite-fired thermal powerplants. Petroleum and liquid fuels supplied 27% of the total, while hydropower supplied the largest share, or 47% of the total. The remaining 2% was supplied from powerplants utilizing bituminous coal. While the percentage of total electricity production supplied by petroleum has gradually declined from the late 1970's, lignite and hydropower have both increased, and still maintain tremendous potential for the future. Turkey was constructing or planning 14 additional hydropower plants, to be completed by 1992, which would add 12.5 billion kilowatt-hours of electricity to the current hydropower output of 12.75 billion kilowatt-hours. More importantly, the eight large lignite-fired powerplants now under construction would raise lignite-based energy production from 6.6 billion to 23.9 billion kilowatt-hours by the year 2000. By that time, Turkey planned to have two nuclear powerplants in operation, which will provide an additional source of energy. Despite these strides toward energy independence, Turkey paid approximately $3.45 billion for petroleum imports in 1982, which was the single largest import item for the country.

Coal.—Turkey's production of both hard coal and lignite increased for the third consecutive year. Hard coal was produced from several mines in the Zonguldak Basin on the western Black Sea coast, where reserves are estimated at 1.26 billion tons. Turkiye Komuleri Isletmeri (TKI), the Government-owned coal mining company, was the only producer of hard coal in the country. Production of hard coal fell approximately 650,000 tons short of domestic demand, estimated at 4.85 million tons, all of which had to be made up for by imports. Imports of hard coal have declined, however, from a high of 905,000 tons in 1978 to the 1982 level. Approximately 50% of Turkey's hard coal production is used to produce coke for the domestic steel industry. Coke production was also insufficient to meet demand as imports of high-quality coke have averaged 20,000 tons per year since 1980. The remainder of the hard coal production is used for electricity production and as home heating fuel.

Production of lignite reached an alltime high of 17.25 million tons as TKI expanded

its operations to meet the growing demand of the thermal powerplants. Electricity production accounted for 60% of lignite consumption, while heating and fertilizer's share went down to 27% and 3%, respectively.

TKI was the dominant lignite producer, responsible for 85% of the country's output, with the private sector's share down to 15% since nationalization. Lignite was mined from several areas around the country, with the largest deposits being integrated with onsite thermal power stations. Present lignite mining capacity was well above 25 million tons per year, with total reserves estimated at 7 billion tons. With expansion and development projects being undertaken at 12 major lignite areas, production capacity was to reach close to 95 million tons by the late 1990's.

At most of the lignite operations, TKI was working jointly with the Turkish Electricity Authority (TEK) in establishing the lignite-based powerplants. The largest of these projects was at Afsin-Elbistan, where 20 million tons per year of lignite were to fuel the world's largest lignite-fired thermal powerplant. Afsin-Elbistan is currently producing 1 billion kilowatt-hours of electricity from the first of eight generators. The Soma power project, located in western Turkey, also nearing completion in 1982, was to consume 5 million tons of lignite annually in the production of 550 megawatts of electricity.

Natural Gas.—All of Turkey's production of nonassociated gas was produced by TPAO, the state-owned oil company. Gas was produced from two main areas; in northwest Turkey (Thrace) on the European side of the Bosphorus, and from the southeastern part of the country at Mardin-Camurlu. In the Thrace area, production from the Hamitabat-Kumrular Fields, located 160 kilometers northwest of Istanbul, averaged 2.33 million cubic feet per day. Reserves at Hamitabat were estimated at 408 billion cubic feet. The World Bank was expected to provide Turkey with a $150 million development loan to pay for drilling 12 new wells, and constructing a 400-kilometer pipeline from Hamitabat to a powerplant at Ambarli, and then splitting into two lines going to fertilizer plants at Gemlik and Izmit.

TPAO was also negotiating with the World Bank for development loans to further explore the Umurca-Ormancik area of Thrace for gas reserves. TPAO's exploratory wells at the Umurca-1 Field have produced both oil and gas in limited quantities. The loan would be to determine the extent of reserves in the field.

In southeastern Turkey, natural gas production began in 1976 from Mardin-Camurlu, and is now producing at a rate of 30 million cubic feet per day. Reserves in both an upper and lower formation were estimated at 150 billion cubic feet. TPAO planned to increase production from the five wells in the area to 40 million cubic feet per day by 1983.

The Turkish Government was holding discussions with Iran and the U.S.S.R. in 1982 concerning construction of new pipelines to bring natural gas into Turkey. The Soviet proposal involved supplying gas to Thrace via Bulgaria through a spur line of the Siberian-West European pipeline now under construction. Another option being considered would link the Soviet's North Caucasus Fields to Batum in Turkey near the northeast border with the U.S.S.R. In September, the Iranians agreed to supply Turkey with natural gas through a new pipeline, although the route of the line has yet to be established. The Iranian pipeline was expected to be capable of meeting all of Turkey's domestic gas requirements.

Petroleum.—Turkey's crude oil production declined slightly in 1982 to 45,740 barrels per day from 46,350 barrels per day in 1981; production was divided among four companies. NV Turkse Shell, a subsidiary of Royal Dutch/Shell of the Netherlands, produced about 21,300 barrels per day from nine major oilfields, the largest of which were Kayakoy and Kayakoy West, Kurkan, Beykan, and Barbes. TPAO was the second largest producer with crude output in 1982 averaging 19,900 barrels per day, 35% of which was derived from the country's oldest and still largest field, Raman. TPAO's other large fields were Garzan, Bati Raman, Yenikoy (all older fields), and Guney Dincer, which began production in 1981. Mobil Exploration Mediterranean Inc., a Mobil Oil Corp. (United States) subsidiary, produced 4,800 barrels per day, mainly from its Selmo Field, and finally, Ersan Sanayii, a privately owned Turkish firm, produced under 100 barrels per day.

Turkey's domestic production of crude oil represented only 8% of the country's requirement, which meant that Turkey imported approximately 105 million barrels of crude oil in 1982 at a cost of $3.45 billion. Imports were derived 39% from Iraq, 23% from Iran, 23% from Libya, and 15% from Saudi Arabia. Turkey's crude oil consump-

tion was estimated at 119 million barrels per year.

To spur domestic production, TPAO began to encourage foreign investment in the petroleum sector. In January 1980, the civilian Government in Turkey liberalized the regulations regarding foreign investment by permitting companies to export up to 35% of their onshore and 45% of offshore oil production at market prices from wells drilled after January 1, 1980. Also, the length of time and bureaucratic procedures to obtain exploration and drilling licenses were shortened and simplified. Prior to the 1980 decrees, foreign companies were only allowed to hold concessions that TPAO did not want. Under the current regulations, TPAO may hold up to 12 licenses in each of the country's 18 exploration districts, but it may not hold more than a total of 180 licenses. Foreign companies are now limited to eight licenses in each district, but they compete evenly with TPAO for concession rights. Also, the ceiling on prices of oil sales to domestic refineries was lifted from $5.21 per barrel to closer to market value. These revised regulations, along with other similar changes, were implemented by decree in 1980, and have subsequently been embodied in the new petroleum law, which was nearing final enactment at the end of 1982. The new law was expected to pass by April 1983.

Despite these reforms, exploration activity has not increased as much as expected. One reason was that the new regulations came at a time when the major companies were cutting back on exploration because of the oil surplus. Turkey was not considered a very favorable area for exploration, owing to its complex and highly discontinuous geology. Nevertheless, some foreign companies have begun exploration work in Turkey, among them Italy's Azienda Generali Italiana Petroli S.p.A., Wintershall AG of the Federal Republic of Germany, Salen Energy of Sweden, and Roy M. Huffington Inc. and Union Texas Oil Co., both of the United States.

Turkey's four operating petroleum refineries, all of which were owned by the state through TPAO, processed a total of 15.5 million tons, or approximately 114 million barrels of crude oil in 1982 and obtained close to 15 million tons, or 101 million barrels of petroleum products. Approximate shares of the total output were 57% from the Istanbul Petrol Rafinerisi AS (IPRAS) facility in Istanbul, 25% from TPAO's Izmir refinery at Aliaga, 12% from the Anadolu Tasfiyehanesi AS plant, and 6% from TPAO's Batman refinery.

Expansion projects were underway at the Batman and Izmir refineries, and a fifth refinery was under construction in central Anatolia. At Izmir, throughput capacity was to be expanded from 3 to 5 million tons per year, a new asphalt unit was scheduled to come onstream early in 1983, and capacity of the lubricating oil unit was to be increased from 176,500 to 875,000 tons per year of lubricating oils. Modernization at Batman involved expanding its powerplant and adding water purification systems.

TPAO, in cooperation with Industrialexport of Romania, was in the process of constructing the central Anatolian refinery. The refinery was to be capable of processing 5 million tons per year of Iraqi crude oil lifted from the Yumurtalik marine terminal at the end of the Iraq-to-Iskenderun pipeline. Initial construction work on the plant had already begun, and commissioning was scheduled for 1986. Capacity at the IPRAS refinery was also expanded, from 8 to 18 million tons per year in 1982, making IPRAS the 10th largest refinery in Europe.

Petrochemicals.—Turkey's petrochemical industry was undergoing a rapid expansion in 1982, as the country's second petrochemical complex neared completion. The Turkish Petrochemical Corp. (Petkim) brought its first facility, located at Yarimca, onstream in 1970. The plant produced 397,973 tons of petrochemical products in 1982, including 81,000 tons of ammonium sulfate, 64,000 tons of benzene, 40,000 tons of polyvinyl chloride (PVC), 30,000 tons of caustic soda, 29,000 tons of liquefied petroleum gas (LPG), 26,000 tons of polyethylene, and 26,000 tons of chloralkali.

Petkim's second complex, at Aliaga near Izmir, was scheduled to come onstream in 1983. The plant was to utilize ethylene and LPG feedstock from the increased output of the Izmir refinery, along with imported raw materials to produce annually 105,000 tons of vinyl chloride monomer, 100,000 tons of PVC, 150,000 tons of low-density polyethylene, 40,000 tons of high-density polyethylene, and several other products. Most of the production units for the plant were already in place, but overall commissioning was not scheduled until the end of 1983. Petkim is a subsidiary of TPAO.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Turkish lira (LT) to U.S. dollars at the rate of LT160=US$1.00. Fluctuations in the value of the lira by over 100% against the dollar since 1980 have distorted dollar denominated absolute percentage changes from year to year. All values and changes reported are real and not a result of fluctuating currency values.

The Mineral Industry of the U.S.S.R.[1]

By Richard Levine[2]

In 1982, increases were reported in fuel and energy production, while decreases were reported in steel and cement production. Natural gas production increased at a rapid rate. Coal finally registered an increase after 3 years of declining production, and oil production increased slowly. The economy suffered shortages owing to a decrease in crude steel, rolled steel, and steel pipe production, and construction was hampered by a 3% decrease in cement production. Labor productivity in the ferrous and nonferrous metals sectors again declined.

The national economy grew at its slowest rate in two decades. National income grew 2.6% in comparison with 3.2% in 1981. Gross industrial output increased 2.8% in comparison with a 3.4% growth in 1981. The growth rate of industrial labor productivity, an important factor in achieving economic growth with the current labor shortage, declined. The change in leadership brought with it a call for increased discipline in the workplace along with speculation concerning economic reform.

Owing to the depletion of the richest and most accessible deposits and the transfer of extractive activity to remote areas of the north and east with severe climatic conditions, the cost of mineral production was greatly increasing. Furthermore, according to a member of the State Planning Committee, Soviet productivity was low compared with Western countries for a number of mineral commodities.[3] Owing to the increased difficulty and cost of production, major emphasis was being placed on the efficient use and conservation of fuel and raw materials.

Substantial losses occurred because of transport problems. Railroads, which were the main means of transport for raw materials, were not equipped to adequately support mineral development. Problems also existed in planning and managing the railroads. Development of the extensive Siberian coal resources was hampered by lack of rail transport.

Waste was stimulated by the Soviet practice of measuring production in tonnage terms. In manufacturing, this practice led to the production of heavier machinery and equipment; in mining, to the production of lower grade ores; and in metallurgy, to the production of lower quality products. Replacement of gross output indicators such as tons or rubles of production with indicators that would stimulate the production of higher quality output was recommended.[4] Efforts were being made to refine the ton indicator. Implementation on a small scale was underway in the steel sector of shifting to a weighted ton indicator that took into account the special characteristics of different products.

The net output indicator, a value-added measurement, was being used to replace gross value output indicators. The net output indicator excluded the cost of raw materials and energy purchased outside the enterprise from the value of production to discourage increasing their use to boost the value of output. However, it was not fully introduced into the Ministries of Ferrous and Nonferrous Metallurgy. The net output indicator was also subject to abuse as enterprises could add to the value of output by increasing labor costs, and this could be particularly harmful given the labor shortage.

In an effort to economize on the use of resources and to promote the production of priority resources, new domestic wholesale

prices for raw materials were introduced in January. This was the first revision of wholesale prices since 1967. Wholesale prices were set to account more fully for production costs, to encourage appropriate substitutions, and to increase recovery of byproducts. The new prices maintained territorial differentiation based on cost of development for some commodities, such as coal, gas, and oil, and specified a single national price for other commodities such as ferrous metals. The price of an ore or concentrate was based on the percentage of the useful component. For example, phosphate ore ranged in price from 0.57 ruble[5] to 1.53 rubles per ton based on its P_2O_5 content. Wholesale prices were raised an average 14% for all basic metals produced by the Ministry of Nonferrous Metallurgy including antimony, bismuth, cadmium, cobalt, copper, indium, lead, mercury, molybdenum, nickel, rhenium, tin, and zinc. Increases were said to be particularly sharp for cobalt, lead, tin, and zinc.[6] Actual price increases, however, were not reported for the nonferrous metals. Domestic wholesale price increases reported in the Soviet press in 1982 for selected commodities, are shown in the following tabulation:

Commodity	Average percent increase
Asbestos	53
Cement	26
Chrome ore	82.1
Coal	42
Coke, metallurgical	18.3
Fuel oil	51
Gas, natural	33
Iron and steel:	
Iron ore	69.2
Pig iron:	
For foundry use	34.6
For steelmaking	30
Sheet, cold-rolled	21.5
Sheet, hot-rolled	18.6
Steel pipe, extruded	7
Steel pipe, rolled	18.3
Metal powders	41- 42
Mica	26- 35
Mineral fertilizers	12
Petroleum, crude	130
Phosphate ore	50-100

In April 1982, the Soviet Union issued a decree empowering Soviet enterprises to engage in deep sea mining. Western analysts claimed that the Soviets' major reason for issuing this decree was that it positioned the U.S.S.R. to participate as a pioneer investor in the Preparatory Investment Protection (PIP) clause of the Law of the Sea Treaty. The PIP clause gave mining organizations that had engaged in a specified amount of exploratory work the right to one mining site. Despite the decree, the Soviets lacked the technology and equipment for deep sea mining.

Mineral Industry Labor.—A problem hampering Soviet economic development was the slow growth in the labor force. Labor supply and labor force growth varied considerably in different regions. Many major new mineral development projects were in the already labor-deficient regions of Siberia and the Soviet Far East. There had not been adequate migration of workers to these areas despite numerous wage and benefit incentives, and the Soviets at times had to rely on a costly program of flying in shifts of workers to some mineral development sites. Increased use of Council of Mutual Economic Assistance (CMEA)[7] labor was underway. Approximately 5,000 workers from the German Democratic Republic were working on construction of the trans-Siberian gas export pipeline, and workers from other CMEA countries, including Vietnam, were being employed in the Soviet Union. Poland's largest construction team on Soviet territory was engaged in building pumping stations, utilities, and worker accommodations for the Surgut-Polotsk petroleum pipeline. Polish workers were also helping to construct the gas export pipeline.

Despite the need to increase labor productivity in mining and metallurgy, the Soviets experienced decreasing labor productivity in several mineral production sectors.

Labor productivity in the minerals sector in 1982, as a percent of 1981 productivity, was as follows:

Coal	99.8
Ferrous metallurgy	99.7
Mineral fertilizers	102.0
Natural gas	105.0
Nonferrous metallurgy	99.7
Petroleum	99.0

In the area of technical training, the Soviet Union graduated 10,000 mining engineers annually in all specialities who were taught by a staff of 450 Doctors of Science and 3,500 Candidates of Science.[8] Preparation occurred at 47 mining engineering schools and at a number of other schools with mining engineering departments. In addition, there were over 500,000 employees in geological and prospecting organizations, with over 60,000 employed in West Siberia. Judging solely by numbers, the Soviet Union did not suffer a shortage of trained technical personnel in mining, metallurgy,

and prospecting. Despite the large number of engineering graduates and geological workers, the effectiveness of their preparation and the efficient utilization of personnel in the economy should be evaluated in making comparisons with Western countries.

Mineral Industry Technology.—In mining, reportedly, up to the following amounts of raw materials were left in deposits: coal, 30% to 40%; iron ore, 20%; natural gas, 50%; petroleum, 70%; and phosphates, 25% to 30%. Declining ore quality further increased the need for mechanization and high-technology equipment. It was calculated that during the 1980's the metal content would decrease 10% to 15% in the majority of nonferrous ores and 12% to 15% in iron ores. Improved metal recovery was somewhat offsetting the decline in ore quality. However, only 50% to 60% of the value of ore constituents was recovered with the percentage dropping at times to 10% to 20%.[9]

Capital investment in plants to produce equipment for the metallurgical industries was low. Furthermore, there were no specialized plants for metallurgical equipment, but rather this equipment was produced at a number of general heavy manufacturing plants.[10] Production problems in the steel industry were blamed, in part, on the suppliers' failure to produce needed equipment.[11] There were also insufficient facilities for recycling metals, which resulted in both loss of output and low-quality product.[12]

During the past 20 years, open pit mining for nonferrous metals had increased from 44% to 65% of the total. Underground mining was hindered by lack of self-propelled equipment, but by 1985, the volume of ore extracted with this equipment was to increase by one-third in comparison with that of 1980.

A major problem hindering the development of surface mining was the lack of trucks. The 40-ton dump trucks used in nonferrous mining were considered too small. The 75-ton trucks, reportedly, were poorly designed and were more often in the shop than on the job, and there was a shortage of 120-ton trucks.[13] In 1981, the average capacity of dump trucks in iron ore mining was 42.3 tons, and in 1982, in nonferrous metal mining, 34 tons. Production of large-capacity shovels was insufficient. The average shovel capacity in nonferrous metal mining was 5.6 cubic meters.[14] Furthermore, the trucks, shovels, and other equipment were often unsuitable for the extreme cold in northern regions, causing considerable delays owing to breakdowns. At times, equipment produced specifically for cold climates was sent to other parts of the country.

The Soviet Union was largely dependent on the West for pipelaying equipment capable of handling large-diameter pipe. Domestic pipelaying equipment production was initiated at the Sterlitamak plant in the Bashkir A.S.S.R., which produced 100 pipelaying machines in 1981; plans were to increase production at Sterlitamak to 1,700 units by 1985. The Soviets were also dependent on imports for submersible pumps for oilfields and high-powered turbines for gas compressor stations.

The West Siberian oil and gas complex had suffered electric power shortages since 1978. Prolonged delays in the construction of local powerplants resulted in some well shutdowns.

Secondary material accounted for over one-third of steel and one-fifth of nonferrous metal production in 1982. The Ministry of Ferrous Metallurgy planned to increase scrap processing by 21%. The quantity of nonferrous scrap processed had decreased since 1978. Efforts to economize by using secondary materials often resulted in waste because quotas for scrap were met by scrapping good metal and machinery.

PRODUCTION

Statistics on output, enterprise capacity, and production plans in physical units of output of nonferrous, precious, and rare metals and some nonmetallics are classified as state secrets. Soviet trade data on precious metals had not been available for decades, and in 1976, the Soviets stopped publishing trade statistics for nonferrous metals. Production and trade data were available for ferrous metals and some nonmetallics.

Some information was available on most mineral commodities and could be used in determining the relative size or growth of the mineral industry. However, Soviet information had to be carefully qualified. Comparisons with Western countries were difficult because Soviet statistics showed minerals produced rather than usefully consumed.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2]

(Thousand metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Ore and concentrate:					
Bauxite, 26% to 57% alumina	4,600	4,600	4,600	4,600	4,600
Nepheline concentrate, 25% to 30% alumina	2,500	2,500	2,500	2,500	2,500
Alunite ore, 16% to 18% alumina	600	600	600	600	600
Alumina	2,600	2,600	2,700	2,800	3,000
Metal, smelter:					
Primary	1,670	1,750	1,760	1,800	1,850
Secondary	150	150	150	150	150
Total	1,820	1,900	1,910	1,950	2,000
Antimony, mine output, recoverable metal content tons	7,900	8,200	8,200	8,600	9,000
Arsenic, white (As_2O_3) do	7,600	7,700	7,700	7,750	7,800
Beryllium: Beryl, cobbed, 10% to 20% BeO do	1,750	1,800	1,800	1,800	1,850
Bismuth, mine output, recoverable metal content do	70	72	72	75	78
Cadmium metal, smelter do	2,800	2,850	2,850	2,900	2,950
Chromium:					
Chrome ore, crude	3,200	[3]3,200	[3]3,400	[3]3,300	3,400
Cobalt:					
Mine output, recoverable metal content tons	1,950	2,000	2,150	2,250	2,400
Metal, smelter do	[r]3,450	[r]3,800	[r]4,200	4,400	4,500
Copper:					
Ore:					
Gross weight, 0.5% to 2% Cu	125,000	126,000	127,000	128,000	131,000
Metal content, recoverable	[r]855	[r]855	900	940	970
Metal:					
Blister:					
Primary	[r]890	[r]930	[r]970	1,030	1,070
Secondary	[r]85	[r]90	95	95	100
Refined:					
Primary	[r]830	[r]870	[r]910	960	1,000
Secondary	170	170	170	170	170
Gold, mine output, metal content thousand troy ounces	8,000	8,160	8,300	8,425	8,550
Iron and steel:					
Iron ore, 55% to 63% Fe[3]	246,251	241,738	244,713	242,417	244,000
Iron ore, metal content[3]	134,369	131,453	132,885	131,071	131,900
Agglomerated products:[4]					
Sinter	159,564	157,427	153,818	154,657	NA
Pellets	45,005	44,012	50,894	54,023	NA
Metal:					
Pig iron and blast-furnace ferroalloys:					
Pig iron for steelmaking[3]	102,496	101,255	99,958	100,576	NA
Foundry pig iron[4]	7,500	7,000	6,600	6,600	NA
Spiegeleisen[5]	50	50	50	50	NA
Ferromanganese[5]	550	550	550	550	NA
Other blast-furnace ferroalloys[4]	100	100	100	--	NA
Total[3 6]	[r]110,702	[r]108,998	[r]107,283	107,766	[4]106,700
Electric-furnace ferroalloys	2,200	2,400	[r]2,400	2,600	3,000
Steel, crude[3]	151,453	149,099	147,941	148,445	147,000
Semimanufactures:[4]					
Sections	39,842	38,716	38,483	38,285	NA
Wire rods	8,231	7,989	8,066	7,877	NA
Pipe stock	6,071	6,040	6,020	6,122	NA
Tubes from ingots	1,862	1,880	1,976	1,917	NA
Plates and sheets:					
More than 5 millimeters thick	14,076	13,592	[r]13,700	NA	NA
Other	20,076	19,682	[r]19,700	NA	NA
Total	34,152	33,274	[r]33,400	NA	NA
Strip	11,109	11,475	10,898	11,010	NA
Railroad track material	4,143	3,971	4,137	3,900	NA
Wheels, tires, axles	1,125	1,068	1,115	1,084	NA
Unspecified shapes for sale	671	633	725	NA	NA
Other and unspecified	71	71	70	59	NA
Total semimanufactures[6]	107,277	105,117	104,878	104,880	NA
Selected end products:					
Total pipes and tubes[3]	17,553	18,185	[r]18,169	18,268	17,900
Cold-rolled sheet[4]	7,017	7,019	6,887	7,551	NA
Electrical sheet[4]	1,173	1,152	1,173	1,136	NA
Cold-reduced strip[4]	471	477	500	NA	NA

See footnotes at end of table.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2] —Continued

(Thousand metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS —Continued					
Lead:					
Mine output, recoverable metal content	410	r415	r420	425	430
Metal, smelter:					
Primary	r470	r475	r475	480	485
Secondary	210	215	215	220	220
Magnesium metal including secondary	70	72	75	78	81
Manganese ore:[3]					
Gross weight	9,057	10,244	9,750	9,150	9,821
Metal content	2,945	3,162	3,040	2,761	2,957
Mercury metal including secondary 76-pound flasks	60,000	61,000	62,000	63,000	64,000
Molybdenum, mine output, metal content tons	9,900	10,200	10,400	10,700	11,000
Nickel:					
Mine output, metal content	149	151	154	158	166
Metal, smelter	r166	r165	r172	178	180
Platinum-group metals, mine output, metal content thousand troy ounces	3,150	3,200	3,250	3,350	3,500
Silver metal including secondary do	46,000	46,000	46,000	46,500	46,875
Tin:					
Mine output, recoverable metal content tons	34,000	35,000	36,000	36,000	37,000
Metal, smelter:					
Primary do	r36,000	r37,000	r38,000	38,000	39,000
Secondary do	12,000	12,000	12,000	12,000	12,000
Total do	r48,000	r49,000	r50,000	50,000	51,000
Titanium:					
Concentrates:					
Ilmenite do	410,000	410,000	420,000	425,000	430,000
Rutile do	10,000	10,000	10,000	10,000	10,000
Metal do	35,000	36,000	37,000	38,500	40,000
Tungsten concentrate, metal content do	8,500	8,700	r8,900	9,100	9,300
Vanadium do	9,000	9,000	9,500	9,500	9,500
Zinc:					
Mine output, recoverable metal content	770	770	785	790	800
Metal:					
Primary	r800	r800	r815	820	830
Secondary	80	80	80	80	80
Zirconium metal	70	75	75	75	80
NONMETALS					
Asbestos	1,945	2,020	2,070	2,105	2,180
Barite	475	500	r510	510	520
Boron minerals and compounds:					
Gross weight	200	200	200	200	200
B_2O_3 content	40	40	40	40	40
Bromine	65	66	67	68	68
Cement, hydraulic[3]	126,956	123,019	125,049	127,169	124,000
Clays: Kaolin including china clay	2,400	2,500	2,500	2,500	2,500
Corundum, natural tons	8,500	8,500	8,600	8,600	8,600
Diamond:					
Gem thousand carats	2,150	2,200	2,250	2,100	2,200
Industrial do	8,400	8,500	8,600	8,500	8,600
Total do	10,550	10,700	10,850	10,600	10,800
Diatomite	220	225	230	230	235
Feldspar	300	310	310	320	330
Fluorspar	510	520	520	530	540
Graphite	100	100	100	105	105
Gypsum	5,300	5,400	5,400	5,500	5,500
Iodine	2	2	2	2	2
Lime, dead-burned	23,500	24,000	24,500	25,000	25,000
Lithium minerals, not further specified	50	50	55	55	60
Magnesite:					
Crude	3,800	3,900	4,000	4,150	4,300
Marketable product	1,900	1,950	2,000	2,075	2,150
Mica	45	46	46	47	48
Nitrogen: N content of ammonia	11,300	12,200	12,400	2,600	12,800
Perlite	360	360	360	360	360

See footnotes at end of table.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2] —Continued

(Thousand metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Phosphate rock:					
Crude ore:					
Apatite, 16% P_2O_5	[r]43,800	44,700	[3]46,500	[3]46,400	[3]48,000
Sedimentary rock	23,500	24,150	[3]24,800	25,400	26,000
Total	[r]67,300	68,850	71,300	71,800	74,000
Concentrate:					
Apatite, 39.4% P_2O_5	[r]16,900	[r]17,200	[r]17,900	18,000	18,300
Sedimentary rock, 19% to 25% P_2O_5	[r]7,000	[r]7,200	[r]7,400	7,600	8,400
Total	[r]23,900	[r]24,400	[r]25,300	25,600	26,700
Potash:					
Ore, gross weight	61,750	50,000	[3]60,800	63,000	61,000
K_2O equivalent[3]	8,193	6,635	8,064	8,449	8,079
Pyrites, gross weight	7,800	7,800	7,900	8,000	8,100
Salt, all types[3]	14,500	14,300	14,600	15,200	15,500
Sodium compounds, n.e.s.:					
Sodium carbonate[3]	4,858	4,782	4,780	4,860	4,800
Sodium sulfate:					
Natural	330	340	350	350	360
Manufactured	240	240	250	250	250
Sulfur:					
Frasch	800	800	[r]800	800	800
Other native	[r]1,900	[r]1,900	[r]2,000	2,050	2,050
S content of pyrites	3,500	3,500	3,550	3,600	3,700
Byproduct:					
Of coal	40	40	40	40	40
Of metallurgy	[r]1,700	[r]1,700	[r]1,800	1,850	1,900
Of natural gas	1,100	1,100	1,200	1,250	1,300
Of petroleum	200	200	200	200	200
Total	[r]9,240	[r]9,240	[r]9,590	9,790	9,990
Sulfuric acid[3]	22,411	22,364	23,033	24,095	23,800
Talc	470	480	490	500	500
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Hard coal (anthracite and bituminous)[3]	557,140	553,960	552,954	544,213	556,000
Lignite and brown coal[3]	166,484	164,704	163,417	159,831	162,000
Total[3 7]	723,624	718,664	716,371	704,044	718,000
Coke: Coke oven beehive, breeze, gas coke	86,400	86,000	86,000	86,000	86,000
Fuel briquets:					
From anthracite and bituminous coal	700	650	600	600	700
From lignite and brown coal	7,302	6,777	6,185	6,171	6,300
Total[3]	8,002	7,427	6,785	6,771	7,000
Gas, natural marketed:					
As reported[3] million cubic meters	372,194	406,597	435,217	465,262	501,000
Converted million cubic feet	13,143,845	14,358,770	15,369,471	16,430,495	17,692,565
Oil shale	35,500	36,000	36,250	[3]37,000	37,000
Peat:					
Agricultural use	215,000	225,000	[3]235,000	[3]280,000	300,000
Fuel use	60,000	60,000	60,000	60,000	60,000
Petroleum:					
Crude:					
As reported, gravimetric units[3]	571,531	585,571	603,207	608,820	613,000
Converted, volumetric units thousand 42-gallon barrels	4,200,753	4,303,947	4,433,571	4,474,827	4,505,550
Refinery products[4 8]	[r]406,387	[r]424,897	[r]436,588	445,590	449,000

[p]Preliminary. [r]Revised. NA Not available.

[1]Production estimated unless otherwise specified.

[2]Includes data available through Oct. 13, 1983.

[3]Reported in Soviet sources.

[4]Reported in United Nations sources.

[5]Estimate based on total of spiegeleisen and blast-furnace ferromanganese reported by United Nations sources.

[6]Data may not add to totals shown because of reporting from different sources.

[7]Run-of-mine coal. The average ash content of coal shipped from mines was 20.2%, and the average calorific value was slightly more than 5,000 kilocalories per kilogram (9,000 British thermal units per pound in 1977).

[8]Not distributed by type and, therefore, not suitable for conversion to volumetric units. Data include all energy products and some nonenergy products as well as refinery fuel and exclude petrochemical feedstocks, paraffin, petroleum coke, white spirit, unspecified minor nonenergy products, and refinery losses.

TRADE

Foreign trade was administered according to the national plan by the Ministry of Foreign Trade and its subordinate foreign trade organizations. Laws of comparative advantage played less of a role in foreign trade than did Government objectives. Two major Soviet objectives were to integrate the economies of Eastern Europe with the Soviet economy and to earn sufficient hard currency to purchase essential commodities, such as grain and advanced technology and equipment.

Mineral exports were used to meet both objectives. The Soviet Union was the chief supplier of fuel and other raw materials to CMEA states, and mineral exports were the chief source of hard currency earnings. The U.S.S.R. provided the great majority of CMEA imports of oil, gas, iron ore, pig iron, rolled ferrous metals, nonferrous metals, phosphate fertilizers, etc. The CMEA states did not pay for these imports with hard currency, but rather supplied the Soviet Union mainly with manufactured and other goods.

Over four-fifths of all Soviet hard currency earnings came from raw materials, and over one-half came from oil. Other significant hard-currency-earning mineral exports included chrome ore, diamonds, gold, natural gas, nickel, platinum-group metals, and uranium compounds. With the completion of the trans-Siberian pipeline to Western Europe in the mid-1980's, gas sales will increase in importance as a source of hard currency.

Many commodities exported were not actually in surplus and could easily have been consumed in the domestic economy. During periods of increased economic need, to gain entry into a market, or for political purposes, the Soviets were willing to sell in a depressed market or below the world market price.

Although a large mineral exporter, the Soviet Union was also an importer of some mineral commodities, such as tin, bauxite, fluorite, and high-quality steel products, of which it did not produce enough to meet its domestic needs. For other commodities, imports served to supply regions far from Soviet sources of supply, to overcome temporary supply breakdowns, or as a political gesture to help friendly countries.

In addition, the Soviet Union assisted in geological exploration and mineral development in a number of developing countries. For example, in Asia, the Soviet Union claimed it was assisting in the development of oil and gas in Afghanistan; gas in Bangladesh; tin in Laos; tin, coal, and oil in Vietnam; coal, copper, molybdenum, fluorspar, gold, and phosphates in Mongolia; iron and steel in North Korea; and coal, iron, steel, and alumina in India.

In the Middle East and Africa, the Soviet Union stated it was assisting development of oil, fluorspar, gas, and other minerals in Algeria; copper, quartz, and other minerals in Angola; oil, gas, and gold in Ethiopia; bauxite in Guinea and Guinea-Bissau; oil in Iraq and Syria; gold in Ghana and Mali; coal, gas, oil, and rare metals in Mozambique; coal, iron, and steel in Nigeria; mixed sulfide ores and gold in the Congo; and oil in Turkey. The Soviets claimed that about 2,000 Soviet engineers and technicians were working in the countries of tropical Africa alone.

The above examples of Soviet assistance are by no means an entire listing of Soviet participation in mineral projects in developing countries, for which the Soviet Union often received minerals in exchange for assistance. In addition, a number of other CMEA countries were participating in mineral development in Africa and Asia.

Soviet oil deliveries to market economy countries increased significantly despite earlier predictions that oil exports to market economy countries would decrease. Increased sales were coupled with decreased deliveries to East Europe. Part of the Soviet increase in oil exports to the West was accounted for by the transshipment of Libyan oil obtained through countertrade.

Estimated Soviet gold sales decreased to 200 tons. Despite large gold sales, the Soviet Union stated that it was experiencing a shortage of gold for domestic needs.[15] Speculation in late 1982 that the Soviet Union was going to reduce palladium sales to the West by at least 25% coincided with a sharp rise in palladium prices.

Increased Soviet nickel sales to the West at reputed low prices were blamed, in part, for the depressed state of the Western nickel industry. In December, European producers filed a dumping complaint regarding Soviet nickel exports with the European Economic Community (EEC). Although the Soviets hoped to export as much as 1.4 trillion cubic feet of natural gas to West Europe through the trans-Siberian

pipeline starting in 1984, at the end of 1982, contracts were concluded for the sale of only about one-half that amount.

Increased trade with West Europe was especially pronounced in the case of Finland. In 1982, the Soviet Union and Finland conducted negotiations regarding a joint venture to develop oil and gas fields in the Arctic Ocean. Discussions with Finland were also underway concerning extending the gas pipeline to increase Finnish gas imports. Greece was also considering constructing a pipeline to import Soviet gas. In late 1982, France reduced imports of oil and petroleum products from the Soviet Union to reduce its trade deficit and presumably to pressure the Soviet Union to purchase more French equipment.

In November 1982, the United States removed sanctions imposed after the imposition of martial law in Poland, and the ban on sales of oil and gas transmission and refining equipment, including pipelines and turbine pumps, was lifted. However, previous controls on oil and gas production equipment remained in effect, and export licenses still had to be processed on a case-by-case basis.

In Latin America and the Caribbean, the U.S.S.R. conducted mineral trade with Argentina, Brazil, Cuba, and Jamaica. The Soviet Union, one of Argentina's largest export customers for grain and beef, supplied Argentina with enriched uranium and heavy water for its nuclear energy industry, after the United States had refused to sell such supplies unless Argentina signed either the international or regional nonproliferation treaties. A trade agreement between the U.S.S.R. and Brazil provided for the U.S.S.R. to supply Brazil with aluminum and nickel, and in 1983, the Soviet Union was to resume bauxite imports from Brazil for its Nikolayevsk alumina plant on the Black Sea. In addition, the Soviet Union concluded a contract for supplies of bauxite from Jamaica. This contract replaced an earlier contract for alumina imports that had not yet gone into effect.

In Cuba, a Caribbean member of CMEA, the U.S.S.R. was assisting in the development of nickel-cobalt facilities with eventual output projected by the Soviets to reach 100,000 tons per year of metal content. The U.S.S.R. was being paid for its assistance with part of the output.

In Asia, the U.S. ban on selling oil and gas equipment to the Soviets affected the joint Japanese-Soviet oil exploration project off the coast of Sakhalin Island. Owing to the sanctions, one of the two rigs involved in the oil and gas exploration could not be used. Japanese firms did benefit, however, from the U.S. ban on export licenses to the Caterpillar Tractor Co. by supplying earth-moving equipment to the Soviet Union. Although Japan was neither providing financing for nor purchasing gas from the trans-Siberian export pipeline, it had good success in selling the Soviet Union steel pipe. Between March 1983 and March 1984, Japan was to supply the U.S.S.R. with 1 million tons of large-diameter steel pipe. Japan imported large amounts of coking coal and nonferrous metals from the U.S.S.R., and gold and precious metals were also major Japanese imports.

The U.S.S.R. was one of India's largest trading partners. The Soviet-Indian 1981-85 trade agreement provided for increased Soviet mica imports. Another agreement provides for increased Soviet exports of oil and petroleum products. The U.S.S.R. was also assisting India in developing metallurgical facilities. The Soviets reportedly increased exports of aluminum to China. A 1982 trade agreement with North Korea provided for North Korean exports to the U.S.S.R. of rolled steel, lead, zinc, and dead-burned magnesite. The U.S.S.R. reported importing tin from Vietnam and Laos.

In Mongolia, along with participation in the large Erdenet copper-molybdenum complex, the U.S.S.R. was assisting in the development of coal and phosphate deposits. Development of the Hubsugul phosphate deposit as well as of the Erdenet complex was being conducted with the participation of other CMEA states. The joint Soviet-Mongolian enterprise, Mongolsovtsvetmet, controlled 92% of Mongolia's mining industry. In 1981 and 1982, the Soviet Union aided in the exploration of Mongolian copper, molybdenum, tungsten, and fluorspar deposits.

The Soviet Union was involved in the exploitation of natural gas and other mineral resources in Afghanistan. In both 1981 and 1982, the U.S.S.R. imported annually 81.2 billion cubic feet of natural gas from Afghanistan. Nevertheless, Soviet imports of natural gas from Afghanistan had declined from their 1978 level, possibly owing to disruptions caused by the war. Of primary importance were the natural gasfields of Gogerdak and Jarq-aduq in northern Afghanistan. The Soviets brought the Jarq-aduq Field onstream in May 1980, increas-

ing Afghan production from about 21.2 to about 38.8 million cubic feet per day. About 95% of Afghanistan's natural gas output was exported to the Soviet Union. In anticipation of the increased output from Jarqaduq, the Soviet Union looped a pipeline from Afghanistan to the Soviet border in 1981. In addition to gas, the Soviets intended to develop the Ainak copper deposit, which contains an estimated 280 million tons of 0.7% to 1.5% copper ore, and infrastructure development had already begun. Development of the 2-billion-ton, 65% iron ore deposits at Hajigak, 100 kilometers northwest of Kabul, was also planned, and the chromite deposits in Nangarher Province near the Pakistan border were under evaluation.

Trade with the CMEA countries was particularly important in the mineral area. The Soviets were providing CMEA countries with minerals in nonhard currency exchanges, which were often considered to be below the world market price. Owing to its need for hard currency and the perceived disparity between ruble prices and world market prices, the Soviet Union was decreasing its oil shipments and increasing the ruble price of oil and gas to CMEA countries. Ruble prices for Soviet crude oil to CMEA countries reportedly increased 28% in 1981, 26% in 1982, and were to increase 19% in 1983. Ruble prices for natural gas to CMEA countries reportedly increased 25% in 1982 and were to increase 17% in 1983. The CMEA states had been negotiating to lessen these price increases owing to falling prices on the world market.

The German Democratic Republic was the Soviet Union's largest trade partner, and raw materials made up a large portion of exports to the German Democratic Republic. According to a 1981-85 trade agreement, the German Democratic Republic was to import annually from the Soviet Union 140 million barrels of petroleum, 230 billion cubic feet of natural gas, 1.7 million tons of iron in iron ore, 960,000 tons of pig iron, 130,000 tons of aluminum, 42,300 tons of copper, 1.3 million tons of coke, and 4.2 million tons of hard coal. The German Democratic Republic imported a number of other minerals from the Soviet Union such as zinc, lead, and magnesium. In 1982, the Soviets reportedly reduced crude oil shipments to the German Democratic Republic. In 1983, crude oil shipments were to decrease to 126 million barrels, and natural gas shipments, to 219 billion cubic feet; iron ore shipments were to increase to 2.3 million tons (iron content).

Poland experienced a decline in production in 1981 in comparison with that of 1980, and some recovery in 1982. The level of Soviet mineral exports to Poland during the past 3 years varied according to the commodity. Crude oil exports declined from 120 million barrels in 1980 to an estimated 94 million barrels in 1982. Natural gas exports decreased from 188 billion cubic feet in 1980 to 186 billion cubic feet in 1981, but were estimated to have increased to 191 billion cubic feet in 1982.

Although Hungary conducted the majority of its trade with market economy countries, it was dependent on the Soviet Union for the most of its raw material imports. Hungary imported approximately 70% of its crude oil, 40% of its natural gas, and a large percentage of its ore and metal requirements from the Soviet Union. Hungary, as part of a continuing exchange, was to export 330,000 tons of alumina to the Soviet Union and was to receive 165,000 tons of aluminum in return. The Soviet Union retained a portion of the primary aluminum as a smelting fee.

Romania was the only CMEA country that did not rely on the Soviet Union for the majority of its imported raw materials. The Soviet Union supplied approximately 45% of Romania's imported iron ore and 20% of its imported phosphate along with pig iron, rolled ferrous and nonferrous metals, and ferroalloys. According to a 1981-85 trade agreement, the Soviet Union was to supply Romania with apatite, asbestos, coke and coking coal, ferroalloys, iron ore, natural gas, pig iron, rolled ferrous and nonferrous metals, and steel. Romania was a large supplier of petroleum industry equipment to the Soviet Union. In 1982, the U.S.S.R. signed a trade agreement with Romania to assist in the construction of a nuclear powerplant. Prior to this agreement, Romania had been developing nuclear power with only Western assistance.

Czechoslovakia imported almost 70% of its fuel and raw materials from CMEA countries, particularly the U.S.S.R. Estimated Soviet exports of crude oil to Czechoslovakia decreased in 1982 in comparison with those of 1981 while exports of natural gas increased slightly. Czechoslovakia's reported imports from the Soviet Union included aluminum, asbestos, carbon black, cement, chromite, hard coal, copper, crude oil, fertilizers (nitrogenous and potassic), iron and steel, lead, manganese, natural

gas, nickel, pyrites, salt, sulfuric acid, and zinc.

Bulgaria was dependent on the Soviet Union for the great majority of its mineral imports. During 1981-85, the Soviet Union was to supply Bulgaria with energy and raw materials including coal, crude oil and oil products, electric energy, iron ore, ferrous and nonferrous metals, and natural gas. In 1982, the Soviet Union signed an agreement with Bulgaria for cooperation in oil and gas exploration on Bulgaria's Black Sea Shelf.

The Soviet Union was engaged in a number of assistance and cooperative programs with the CMEA countries. All of the East European, full-CMEA-member countries and Cuba were developing nuclear power programs with Soviet assistance. Furthermore, a number of CMEA countries were participating in nuclear development projects within the Soviet Union for which they were to receive energy in return. The CMEA countries were cooperating in other mineral development ventures. These included Petrobaltic, an offshore drilling consortium including the U.S.S.R., Poland, and the German Democratic Republic, organized for drilling in Baltic waters, and the Kiyembay asbestos complex in Orenburg Oblast', U.S.S.R., with a projected capacity of 500,000 tons per year, which was being built with a one-third investment of the CMEA countries in return for one-third of the output. The CMEA countries also were providing equipment and workers for gas and oil pipeline projects in the Soviet Union.

Table 2.—U.S.S.R.: Estimated production, trade, and consumption of mineral commodities in 1982

(Thousand metric tons unless otherwise specified)

Commodity	Production	Imports	Exports	Apparent consumption
METALS				
Aluminum:				
Bauxite	4,600	3,700	--	8,300
Nepheline concentrate	2,500	--	--	2,500
Alunite	600	--	--	600
Alumina	3,000	1,300	--	4,300
Metal:				
Primary	1,850	(1)	600	1,250
Secondary	150	--	70	80
Antimony tons	9,000	800	--	9,800
Arsenic, white (As_2O_3) do	7,800	--	50	7,750
Beryllium, 10% to 20% BeO do	1,850	(1)	(1)	1,850
Bismuth do	78	200	--	278
Cadmium do	2,950	50	50	2,950
Chrome ore	3,400	--	[2]600	2,800
Cobalt tons	2,400	2,100	--	4,500
Copper:				
Mine output, metal content	970	120	(1)	1,090
Unwrought, unalloyed, semimanufactured	1,090	20	180	930
Secondary	100	(1)	(1)	100
Gold thousand troy ounces	8,550	--	6,430	2,120
Iron and steel:				
Iron ore	[2]244,000	(1)	[3]55,000	189,000
Pig iron	[2]106,700	(1)	4,500	102,200
Steel:				
Crude	[2]147,000	(1)	800	146,200
Rolled	[2]102,000	8,000	6,600	103,400
Lead:				
Mine output, metal content	430	30	--	460
Primary	460	70	100	430
Secondary	220	--	--	220
Magnesium metal	81	--	3	78
Manganese ore	[2]9,821	200	[2]1,100	8,921
Mercury 76-pound flasks	64,000	--	(1)	64,000
Molybdenum tons	11,000	900	(1)	11,900
Nickel:				
Mine output, metal content	166	14	--	180
Smelter production	180	--	46	134
Platinum-group metals thousand troy ounces	3,500	(1)	1,700	1,800
Silver do	46,875	5,000	--	51,875
Tin:				
Mine output, metal content tons	37,000	2,000	--	39,000
Primary do	39,000	17,000	--	56,000
Secondary do	12,000	--	--	12,000

See footnotes at end of table.

Table 2.—U.S.S.R.: Estimated production, trade, and consumption of mineral commodities in 1982 —Continued

(Thousand metric tons unless otherwise specified)

Commodity	Production	Imports	Exports	Apparent consumption
METALS —Continued				
Titanium metal ---tons	40,000	--	3,500	36,500
Tungsten ---do	9,000	4,600	[1]	13,600
Zinc:				
Mine output, metal content	800	30	--	830
Primary	830	70	100	800
Secondary	80	--	--	80
NONMETALS				
Asbestos	2,180	[1]	650	1,530
Barite	520	500	--	1,020
Cement	124,000	[2]250	[2]2,200	122,050
Clays	2,500	[1]	250	2,250
Corundum, natural ---tons	8,600	--	1,500	7,100
Diamond:				
Gem ---thousand carats	2,200	[1]	1,200	1,000
Industrial ---do	8,600	[1]	700	7,900
Diatomite	235	[1]	[1]	235
Feldspar	330	--	--	330
Fertilizer materials:				
Nitrogen: N content	12,800	100	2,900	10,000
Phosphatic rock	26,700	--	5,000	21,700
Potash, K_2O equivalent	[2]8,079	--	2,800	5,279
Fluorspar	540	600	--	1,140
Graphite	105	[1]	5	100
Gypsum	5,500	[1]	150	5,350
Lime, dead-burned	25,000	[1]	[1]	25,000
Magnesite, crude	4,300	700	30	4,970
Mica	48	1	--	49
Salt, all types	15,500	[1]	500	15,000
Sulfur, all types	9,990	1,000	400	10,590
Sulfuric acid	[2]23,800	100	175	23,725
Talc	500	15	[1]	515
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite and bituminous	556,000	9,000	27,000	538,000
Lignite and brown coal	162,000	20,000	[1]	182,000
Gas, natural	501,000	4,000	60,000	445,000
Oil shale	37,000	--	--	37,000
Peat:				
Agricultural	300,000	--	--	300,000
Fuel use	60,000	--	--	60,000
Petroleum:				
Crude	613,000	5,000	130,000	488,000
Refinery products	449,000	1,000	45,000	405,000

[1]Less than 1/2 unit.
[2]Reported in Soviet sources.
[3]Includes concentrates.

Table 3.—U.S.S.R.: Net import reliance of selected minerals and metals as a percent of consumption in 1982

Commodity	Percent of consumption	Principal sources
Antimony	8	Yugoslavia.
Barite	49	Bulgaria, North Korea, Yugoslavia.
Bauxite and alumina	48	Greece, Guinea, Hungary, India, Jamaica, Yugoslavia.
Bismuth	72	Japan.
Cobalt	47	Cuba.
Fluorspar	53	China, Mongolia, Thailand.
Iron and steel, high-quality products	3	Belgium-Luxembourg, West Germany, Italy, Japan.
Magnesite	14	North Korea.
Mica	2	India (imports are strategic-grade).
Molybdenum	8	Mongolia.
Silver	10	Switzerland, United Kingdom.
Tin	33	Malaysia, Singapore, United Kingdom.
Tungsten	34	China, Mongolia.

Table 4.—U.S.S.R.: Net exports of selected minerals and metals as a percent of consumption in 1982[1]

Commodity	Percent of consumption
Aluminum	48
Asbestos	42
Chromium ore	21
Diamond, gem	120
Gas, natural	13
Gold	300
Iron ore and concentrate	29
Manganese ore	12
Nickel, smelter production	34
Nitrogen fertilizer	29
Petroleum, crude, and refinery products	40
Phosphate rock	24
Platinum-group metals	94
Potash	53
Titanium	10

[1]Selection made from commodities for which exports comprise 10% or more of consumption.

Table 5.—U.S.S.R.: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium, oxides and hydroxides	NA	423	--	Japan 235; Spain 72; West Germany 87.
Alkaline-earth metals	NA	9	--	All to Netherlands.
Rare-earth metals	NA	37	--	All to Japan.
Unspecified	34	210	1	West Germany 132; Italy 59; Spain 16.
Aluminum:				
Oxides and hydroxides[2]	2,250	2,250	--	All to Cuba.
Metal including alloys:				
Scrap	27,385	56,353	2,782	Austria 47,273; Finland 2,626; West Germany 2,581.
Unwrought	377,960	360,905	580	Hungary 151,334; Czechoslovakia 68,000; Japan 65,035.
Semimanufactures	12,037	15,046	8	Yugoslavia 8,098; Poland 5,784.
Antimony:				
Ore and concentrate	45	NA		
Oxides	NA	122	--	All to West Germany.
Beryllium: Metal including alloys, all forms	2	(3)	--	All to Netherlands.
Chromium:[2]				
Ore and concentrate thousand tons	567	567	76	Poland 140; Czechoslovakia 130; Yugoslavia 88.
Oxides and hydroxides	3,496	5,154	--	France 751; Czechoslovakia 673; Bulgaria 550.
Cobalt: Oxides and hydroxides kilograms	--	3	--	All to Japan.
Copper:				
Sulfate[2]	20,856	21,102	--	Bulgaria 8,504; Hungary 3,680; Yugoslavia 1,020.
Metal including alloys:				
Scrap	1,913	3,383	--	Austria 2,658; Switzerland 725.
Unwrought	47,260	47,619	--	Czechoslovakia 39,000; Finland 4,888.
Semimanufactures	530	402	--	Poland 211; Yugoslavia 144; Japan 30.
Gallium: Metal including alloys, all forms kilograms	--	200	--	All to West Germany.
Germanium: Metal including alloys, all forms do	200	[4]212	163	All to Japan.

See footnotes at end of table.

Table 5.—U.S.S.R.: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	NA	1,495	--	Japan 1,191; West Germany 297.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite[2] thousand tons	46,873	54,429	--	Czechoslovakia 13,211; Poland 10,554; Romania 7,384.
Pyrite, roasted do	93	106	--	All to Hungary.
Metal:				
Scrap[2] do	2,500	2,681	--	East Germany 584; Italy 429; Yugoslavia 296.
Pig iron, cast iron, related materials do	2,968	3,105	--	Poland 1,479; Czechoslovakia 839; Bulgaria 410.
Ferroalloys:				
Ferrochromium do	NA	20	--	Hungary 6; West Germany 5; Austria 3.
Ferromanganese do	NA	24	--	All to Hungary.
Ferrosilicomanganese do	NA	20	--	Romania 15; Finland 5.
Ferrosilicon do	NA	17	--	Hungary 7; West Germany 5; Finland 3.
Unspecified do	117	8	1	Belgium-Luxembourg 4; Sweden 2.
Steel, primary forms do	969	736	(3)	Hungary 413; Yugoslavia 201; West Germany 47.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	1,493	1,166	--	Poland 615; East Germany 269; Hungary 146.
Universals, plates, sheets do	999	1,033	--	East Germany 512; Hungary 235; Bulgaria 167.
Hoop and strip	14,738	20,154	--	Yugoslavia 9,280; Bulgaria 6,382; Jordan 3,626.
Rails and accessories	1,676	1,681	--	Yugoslavia 1,627.
Wire	6,749	3,463	--	Libya 2,189; Hungary 812; Jordan 189.
Tubes, pipes, fittings	45,294	39,919	140	Yugoslavia 9,478; West Germany 8,670; Jordan 4,657.
Castings and forgings, rough	868	936	--	West Germany 717; Egypt 157; Austria 60.
Lead: Metal including alloys:				
Scrap	31	NA		
Unwrought	36,118	27,059	--	Czechoslovakia 20,000; Finland 7,000.
Magnesium: Metal including alloys, unwrought	752	37	--	All to West Germany.
Manganese:				
Ore and concentrate, metallurgical-grade[2] thousand tons	1,255	1,194	--	Poland 493; Czechoslovakia 372; East Germany 130.
Oxides	23	NA		
Mercury 76-pound flasks	2,930	464	--	West Germany 348; Austria 58.
Metalloids:				
Boron and arsenic including alloys, all forms	NA	15	--	All to Japan.
Phosphorus[2]	NA	47,835	--	Poland 10,360; Romania 2,041; Japan 1,683.
Tellurium and arsenic	NA	31	--	West Germany 20; Japan 6; Netherlands 5.
Unspecified	2,425	6,270	5,347	Switzerland 844; Yugoslavia 50.
Molybdenum:				
Ore and concentrate	14	NA		
Metal including alloys, all forms kilograms	--	3	--	All to Japan.
Nickel:				
Ore and concentrate	29	NA		
Matte and speiss	1,206	804	--	Sweden 792.
Metal including alloys:				
Scrap	858	4	--	All to Austria.
Unwrought	32,068	29,245	4,114	West Germany 6,624; France 4,654; Czechoslovakia 4,344.
Semimanufactures	160	229	--	Yugoslavia 212.

See footnotes at end of table.

Table 5.—U.S.S.R.: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified ____ value, thousands__	$438,068	$126,918	$50,572	West Germany $38,566; Switzerland $17,386; France $15,817.
Silver:				
Ore and concentrate[5] _____do____	--	$87	$87	
Waste and sweepings[5] _____do____	$665	NA		
Metal including alloys, unwrought and partly wrought _____do____	$2	$5	--	All to West Germany.
Tin: Metal including alloys, unwrought _	1	NA		
Titanium:				
Oxides _____	20	21	--	All to United Kingdom.
Metal including alloys, all forms ___	2,770	1,504	468	West Germany 727; Sweden 153; Italy 68.
Zinc:				
Ore and concentrate _____	83	NA		
Oxides _____	8	(3)	--	All to Spain.
Metal including alloys:				
Scrap _____	--	22	--	All to West Germany.
Unwrought _____	24,875	13,156	--	Czechoslovakia 9,000; Poland 4,116.
Semimanufactures _____	--	55	--	Greece 30; Egypt 22.
Other:				
Ores and concentrates _____	1,292	15,386	--	All to Hungary.
Oxides and hydroxides _____	100,648	435	--	Yugoslavia 135; Japan 125; Italy 80.
Ashes and residues _____	67,341	69,310	--	Austria 68,976.
Base metals including alloys, all forms	21,110	18,187	(3)	Czechoslovakia 14,000; Austria 2,961; Poland 1,110.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc _____	--	17	--	All to France.
Artificial:				
Corundum _____	1,299	745	--	All to West Germany.
Silicon carbide _____	NA	2,297	--	Do.
Dust and powder of precious and semi-precious stones including diamond value, thousands__	$1,674	$1,110	$8	Belgium-Luxembourg $492; Yugoslavia $346; Italy $96.
Grinding and polishing wheels and stones[5] _____	13	1	--	All to Finland.
Asbestos, crude _____	315,780	306,805	--	Poland 77,850; Japan 38,130; Yugoslavia 36,136.
Barite and witherite _____	120	60	--	All to Yugoslavia.
Boron materials:				
Crude natural borates _____	2,778	3,621	--	All to Japan.
Oxides and acids _____	[2]15,355	[2]14,558	--	Japan 3,252; Hungary 1,500; Yugoslavia 500.
Cement[2] _____ thousand tons__	3,245	2,735	--	Hungary 505; Saudi Arabia 503; Yugoslavia 269.
Chalk _____	87	261	--	All to Finland.
Clays and clay products:				
Crude:				
Chamotte earth _____	26,095	1,493	--	Poland 1,463.
Fire clay _____	9,239	5,861	--	All to Poland.
Kaolin _____	32,769	28,662	--	Hungary 17,362; Yugoslavia 8,521; Austria 2,745.
Unspecified _____	79	1,578	--	Hungary 1,512; Netherlands 25; Finland 21.
Products:				
Nonrefractory _____	20,687	14,136	--	Finland 13,536; Jordan 595.
Refractory including nonclay brick[2] _____	120,255	91,356	--	Cuba 24,493; Romania 24,139; Bulgaria 19,739.
Diamond:				
Gem, not set or strung value, thousands__	$1,305,714	$225,660	$1,827	Belgium-Luxembourg $171,860; West Germany $29,531; United Kingdom $11,378.
Industrial _____do____	$253	$13,911	--	Japan $13,217; Belgium-Luxembourg $555; Italy $86.
Diatomite and other infusorial earth ___	--	84	--	West Germany 62; France 22.
Feldspar, fluorspar, related materials:				
Unspecified _____	--	23	--	All to Belgium-Luxembourg.

See footnotes at end of table.

Table 5.—U.S.S.R.: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	--	153	--	Sweden 118; Italy 35.
Manufactured:				
Ammonia thousand tons	1,825	1,863	722	Italy 381; Spain 186; Finland 167.
Nitrogenous[2] do	2,866	3,401	23	Cuba 544; Czechoslovakia 378; Hungary 328.
Phosphatic[2] do	704	753	--	Cuba 287; Bulgaria 268; Hungary 131.
Potassic do	6,603	5,245	13	Poland 2,312; Hungary 651; Czechoslovakia 286.
Unspecified and mixed do	55	43,809	--	Hungary 43,084.
Graphite, natural	11,536	3,972	310	Japan 2,888; Poland 555; United Kingdom 109.
Gypsum and plaster	35,205	43,917	--	Sweden 23,100;[2] Finland 20,800.[2]
Halogens:				
Bromine	--	101	--	All to Hungary.
Iodine	33	19	--	Do.
Unspecified	101	25	--	All to Belgium-Luxembourg.
Lime	45	NA		
Magnesium compounds:				
Magnesite	29,402	7,505	--	Hungary 6,284; Japan 1,221.
Oxides and hydroxides	NA	10	--	All to Austria.
Other	NA	8,648	--	Finland 5,180; Netherlands 3,458.
Mica: Worked including agglomerated splittings	2	NA		
Phosphates, crude thousand tons	3,780	3,921	--	Bulgaria 914; Poland 857; Hungary 499.
Pigments, mineral: Iron oxides and hydroxides, processed	244	719	--	Yugoslavia 696; France 21.
Potassium salts, crude	1,077	1,608	--	All to Hungary.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$749	$1,305	$117	Austria $569; Italy $373; Hong Kong $115.
Synthetic do	$438	$611	--	Austria $478; West Germany $52; Switzerland $47.
Pyrite, unroasted[2] thousand tons	911	536	--	Bulgaria 271; Hungary 91; Italy 84.
Salt and brine[2]	480,865	452,843	--	Czechoslovakia 151,476; Hungary 150,000; Denmark 53,346.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1	NA		
Sodium carbonate, natural and manufactured	43,275	33,742	--	Finland 18,149; Italy 9,938; United Kingdom 3,249.
Sodium hydroxide	745	1,501	--	Yugoslavia 1,478.
Sodium sulfate, natural and manufactured	NA	[2]51,305	--	Yugoslavia 14,400;[2] Sweden 3,785.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	22,162	15,407	--	West Germany 8,382; Italy 4,981; France 1,011.
Worked	1,524	[7]15	([7])	France 8; West Germany 4.
Gravel and crushed rock	394	NA		
Limestone other than dimension	--	2,046	--	All to Finland.
Quartz and quartzite	--	45	--	All to Italy.
Sand other than metal-bearing	228	([3])	--	All to Japan.
Sulfur:				
Elemental, crude including native and byproduct	60,525	43,506	--	All to Hungary.
Sulfuric acid[2]	172,181	179,912	--	Czechoslovakia 167,341.
Vermiculite	NA	64,336	--	Spain 31,600; Belgium-Luxembourg 24,840.
Other:				
Crude	97,412	125,030	--	Spain 36,850; Italy 33,687; Belgium-Luxembourg 24,840.
Slag and dross, not metal-bearing	420	([3])	--	All to Japan.
Oxides and hydroxides of barium, magnesium, strontium	539	469	357	West Germany 94; United Kingdom 18.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	67,357	--	Poland 65,330; Finland 1,382.

See footnotes at end of table.

Table 5.—U.S.S.R.: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	8	455	--	All to Japan.
Carbon: Carbon black[2]	103,835	107,861	20	Bulgaria 28,644; Hungary 22,341; East Germany 22,225.
Coal:				
Anthracite and bituminous thousand tons	21,334	17,878	--	Bulgaria 5,090; Czechoslovakia 3,273; East Germany 2,615.
Briquets of anthracite and bituminous coal	--	2,078	--	All to Yugoslavia.
Lignite including briquets	79,905	65,875	--	Yugoslavia 57,613; Japan 4,075; Hungary 4,043.
Coke and semicoke thousand tons	2,938	2,792	--	East Germany 1,262; Finland 715; Hungary 503.
Gas, natural million cubic feet	1,406,292	1,463,512	--	Czechoslovakia 301,729; Italy 271,217; East Germany 212,247.
Gas, manufactured do	--	304	--	All to Finland.
Hydrogen, helium, rare gases	2,341	2,507	--	Finland 2,320; Norway 99; Sweden 80.
Peat including briquets and litter	219,511	171,371	--	West Germany 49,560; Austria 24,161; Italy 18,641.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	651,465	740,561	--	East Germany 139,915; Czechoslovakia 133,256; Poland 96,292.
Refinery products:				
Liquefied petroleum gas do	1,845	933	--	West Germany 505; Hungary 245; Belgium-Luxembourg 136.
Gasoline do	40,140	39,904	529	Netherlands 12,528; West Germany 11,544; Hungary 4,589.
Mineral jelly and wax do	42	23	[3]	Finland 18; Norway 2.
Kerosine and jet fuel do	2,570	2,759	--	Hungary 1,831; West Germany 584; Ireland 176.
Distillate fuel oil do	91,990	101,058	2,280	Netherlands 21,251; Switzerland 17,673; France 11,548.
Lubricants do	2,120	1,467	--	Denmark 635; Italy 327; Finland 130.
Nonlubricating oils do	1	[3]	--	All to Jordan.
Residual fuel oil do	48,621	44,644	188	Finland 9,900; Italy 7,060; France 5,442.
Bitumen and other residues do	56	NA		
Petroleum coke do	--	951	--	Italy 456; Japan 346; Spain 97.
Unspecified do	21,776	21,308	--	All to Poland.
Tars and other crude chemicals derived from coal, gas, and petroleum	242,958	157,338	[8]	Netherlands 44,279; East Germany 24,926; Yugoslavia 15,666.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by the U.S.S.R., this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Official Trade Statistics of the U.S.S.R.

[3]Less than 1/2 unit.

[4]Excludes imports by France valued at $83,732.

[5]May include other precious metals.

[6]Excludes quantity valued at $1,264,000 in 1980 and $1,134,000 in 1981.

[7]Excludes quantity valued at $73,000, of which $63,000 was imported by the United States.

[8]The United States imported 409,146 barrels of naphtha.

Table 6.—U.S.S.R.: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	3,316	3,286	--	Guinea 2,250;[2] Greece 579; Brazil 306.[2]
Oxides and hydroxides do	1,123	916	36	Yugoslavia 522; Hungary 354.
Metal including alloys:				
Unwrought	645	511	11	United Kingdom 464; Finland 36.
Semimanufactures	9,622	10,130	56	Austria 4,368; West Germany 2,271; Finland 1,112.
Antimony: Metal including alloys, all forms	600	820	--	All from Yugoslavia.
Bismuth: Metal including alloys, all forms	15	80	--	All from Japan.
Cadmium: Metal including alloys, all forms	--	50	--	Italy 45.
Chromium: Oxides and hydroxides	17	NA		
Cobalt:				
Oxides and hydroxides kilograms	25	50	--	All from Japan.
Metal including alloys, all forms	2	38	--	All from France.
Columbium and tantalum:				
Ore and concentrate	--	13	--	All from West Germany.
Metal including alloys, all forms, tantalum	18	NA		
Copper:				
Ore and concentrate	111,378	97,516	57,920	Indonesia 19,244; Spain 12,949; Sweden 7,403.
Metal including alloys:				
Scrap	25	4,037	--	Japan 4,036.
Unwrought	9,980	15,036	--	Belgium-Luxembourg 6,754; Poland 4,361; United Kingdom 3,921.
Semimanufactures	20,361	19,208	38	Yugoslavia 6,568; Poland 4,788; Japan 3,280.
Gold: Ore and concentrate value, thousands	NA	$139	--	All from Canada.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	20,577	NA		
Metal:				
Scrap	20,577	21,434	34	Mongolia 21,400.[3]
Pig iron, cast iron, related materials	71,260	5,301	2	Sweden 4,629; Yugoslavia 200.
Ferroalloys:				
Ferromolybdenum	NA	38	--	All from Sweden.
Ferrosilicon	NA	2,669	--	North Korea 2,636.[3]
Unspecified	6,975	85	--	All from Norway.
Steel, primary forms	61,137	36,974	--	West Germany 17,539; Czechoslovakia 10,000; United Kingdom 3,506.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	[4]1,348	1,310	--	Japan 411; Poland 211; Spain 198.
Universals, plates, sheets do	2,836	[5]2,726	([6])	West Germany 935; Austria 550; Belgium-Luxembourg 326.
Hoop and strip	[7]370,185	315,304	237	West Germany 239,868; Japan 21,750; Italy 19,507.
Rails and accessories	381	95	--	Belgium-Luxembourg 91.
Wire	[8]25,488	26,970	--	Belgium-Luxembourg 14,062; West Germany 3,647; United Kingdom 3,429.
Tubes, pipes, fittings thousand tons	2,833	3,103	([6])	Japan 1,262; West Germany 718; Italy 499.
Castings and forgings, rough	3,666	9,119	--	Poland 4,517; West Germany 2,656; Italy 765.
Lead:				
Ore and concentrate	53,706	97,494	--	Iran 33,330;[9] Canada 15,943; Greece 7,300.
Oxides	5,645	7,594	--	France 3,504; West Germany 2,890; United Kingdom 500.
Metal including alloys:				
Unwrought	60,513	34,659	--	France 9,126; Spain 5,500; United Kingdom 5,172.
Semimanufactures	2,046	4,957	--	Spain 4,950.

See footnotes at end of table.

Table 6.—U.S.S.R.: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Unwrought	5	NA		
Semimanufactures	--	49	--	All from Finland.
Manganese:				
Ore and concentrate, metallurgical-grade	--	148,165	--	All from Hungary.
Oxides	4,082	4,782	1,000	Japan 1,261; Ireland 1,170; Greece 1,151.
Metalloids:				
Silicon	NA	25,803	--	Norway 15,257; Yugoslavia 9,535; Spain 1,000.
Unspecified	51,834	13,145	1	France 10,943; Portugal 2,200.
Molybdenum:				
Ore and concentrate	326	891	891	
Metal including alloys, all forms	1	25	1	Japan 24.
Nickel: Metal including alloys:				
Unwrought	([6])	1	--	All from West Germany.
Semimanufactures	25	84	--	France 64; West Germany 17.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified	$3,069	$6,086	--	United Kingdom $3,585; West Germany $2,490.
Silver:				
Ore and concentrate ...do...	$4,172	$1,571	--	All from Canada.
Metal including alloys, unwrought and partly wrought ...do...	$17,271	$7	--	All from Switzerland.
Tin:				
Ore and concentrate	1,851	396	--	All from Singapore.
Metal including alloys:				
Unwrought	14,241	5,795	--	United Kingdom 4,846; Singapore 654.
Semimanufactures	1	([6])	--	All from Switzerland and Yugoslavia.
Titanium:				
Oxides	2,321	2,381	--	West Germany 2,375.
Metal including alloys, all forms	1	NA		
Tungsten:				
Ore and concentrate	963	651	--	United Kingdom 556; Netherlands 80.
Metal including alloys, all forms	67	[10]62	9	Japan 51.
Vanadium: Oxides and hydroxides	--	$3,541	--	All from Finland.
Zinc:				
Ore and concentrate	51,128	75,682	--	Peru 26,200;[9] Sweden 26,021; Canada 13,268.
Oxides	107	125	--	France 100; Yugoslavia 25.
Blue powder	1,089	NA		
Metal including alloys:				
Unwrought	61,305	26,098	--	Finland 10,613; Spain 6,498; Netherlands 4,733.
Semimanufactures	2,965	2,398	--	Poland 1,801; Yugoslavia 547.
Other:				
Ores and concentrates	[11]97,104	95,815	--	Norway 93,964.
Oxides and hydroxides	12,812	7,027	--	Finland 3,505; Sweden 1,760; Austria 1,638.
Ashes and residues	160	NA		
Base metals including alloys, all forms	4,171	22	2	Japan 10; West Germany 9.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	14	5	--	All from West Germany.
Artificial: Corundum	--	70	--	Japan 67.
Dust and powder of precious and semi-precious stones, including diamond	$338	NA		
Grinding and polishing wheels and stones	2,411	[12]3,384	12	United Kingdom 1,053; Austria 843; Italy 524.
Barite and witherite	44,438	2,857	--	Italy 2,227; Japan 630.
Boron materials: Oxides and acids	2	6	--	All from West Germany.
Cement[3]	523,000	200,000	--	North Korea 155,000.

See footnotes at end of table.

Table 6.—U.S.S.R.: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Chalk	--	160	--	All from Finland.
Clays and clay products:				
Crude:				
Bentonite	NA	283	--	All from Yugoslavia.
Unspecified	1,568	4,127	100	Senegal 4,000.
Products:				
Nonrefractory	15,440	20,402	--	Japan 16,816; Italy 1,692; Finland 1,550.
Refractory including nonclay brick	28,769	15,345	44	West Germany 4,224; Japan 3,136; France 2,487.
Diamond:				
Gem, not set or strung value, thousands	$246	NA		
Industrial do	$530	$294	--	Belgium-Luxembourg $221; United Kingdom $65.
Diatomite and other infusorial earth	1,875	419	--	Japan 220; Iceland 197.
Feldspar, fluorspar, related materials:				
Fluorspar	NA	111,869	--	Thailand 74,000; Spain 37,869.
Unspecified	104,377	3,027	--	Thailand 3,000.
Fertilizer materials: Manufactured:				
Ammonia	--	5	--	All from Japan.
Nitrogenous	96,146	71,613	--	Afghanistan 51,600;[3] North Korea 20,011.[3]
Phosphatic	[3]249,958	[3]229,275	--	Morocco 143,870;[3] Yugoslavia 84,859.
Unspecified and mixed	22,262	12,750	--	Yugoslavia 12,429; Finland 317.
Graphite, natural	10	43	--	All from France.
Gypsum and plaster	10	13	--	Yugoslavia 12.
Halogens: Chlorine	NA	32,879	--	All from Finland.
Lime	1,024	621	--	Finland 570; Yugoslavia 51.
Magnesium compounds:				
Magnesite[3]	539,601	593,015	--	North Korea 477,915; Turkey 53,360.
Oxides and hydroxides	NA	6,250	--	France 4,600; Japan 850; West Germany 800.
Other	NA	940	--	All from Netherlands.
Mica:				
Crude including splittings and waste	1	NA		
Worked including agglomerated splittings	40	4	--	All from United Kingdom.
Nitrates, crude	2,000	2,730	--	All from Hungary.
Pigments, mineral: Iron oxides and hydroxides, processed	977	1,292	--	Japan 1,067; West Germany 224.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$40	$88	--	All from West Germany.
Synthetic do	$2,175	$1,039	--	Switzerland $526; France $505.
Salt and brine	102,390	[3]100,342	--	All from China.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	2,435	9,110	--	Italy 7,680; France 1,000; Japan 300.
Sodium carbonate, natural and manufactured	487,990	476,154	--	Bulgaria 452,126; Poland 23,924.
Sodium hydroxide	64,819	86,352	--	Italy 31,785; Finland 24,013; Spain 9,040.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	213	65	--	Yugoslavia 40; Finland 16.
Worked	964	458	--	All from Yugoslavia.
Gravel and crushed rock	19,060	24,583	--	Hungary 15,510; Finland 8,879.
Limestone other than dimension	--	63	--	All from Finland.
Quartz and quartzite	1,264	611	--	Finland 539; Italy 36; Sweden 25.
Sand:				
Construction cubic meters	4,806	7,212	--	All from Hungary.
Industrial, not metal-bearing	522	71	--	Finland 66.
Sulfur:				
Elemental, crude including native and byproduct	742,000	927,185	--	Poland 792,000; Canada 135,180.
Dioxide	NA	101	--	All from Switzerland.
Sulfuric acid	92,394	80,247	--	Poland 79,921.
Talc, steatite, soapstone, pyrophyllite	3,447	12,936	--	Finland 12,861.
Other:				
Crude	5,756	3,022	(6)	Italy 3,000.
Slag and dross, not metal-bearing	13	NA		
Oxides and hydroxides of barium, magnesium, strontium	5,017	398	--	All from France.

See footnotes at end of table.

Table 6.—U.S.S.R.: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	4,231	--	Finland 2,469; West Germany 1,551.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,002	437	--	Finland 432.
Carbon: Carbon black	[3]448	[3]551	--	Japan 300; West Germany 156.
Coal:				
Bituminous thousand tons	6,041	3,834	--	All from Poland.
Lignite including briquets	20,326	18,058	--	All from Hungary.
Coke and semicoke	501,404	705,000	--	All from Poland.
Gas natural million cubic feet	140,380	339	--	All from Hungary.
Gas, manufactured do	--	2	--	All from Finland.
Hydrogen, helium, rare gases	5	([6])	--	All from Japan.
Peat including briquets and litter	227	406	--	Sweden 399.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	209	974	--	Austria 510; Finland 464.
Gasoline do	289	6,006	--	Finland 2,976; Austria 2,788.
Mineral jelly and wax do	12,041	46	--	West Germany 31; United Kingdom 15.
Kerosine and jet fuel do	367,288	347,003	--	Hungary 236,677; Austria 74,594; Yugoslavia 17,980.
Distillate fuel oil do	212,662	276,973	--	Hungary 211,439; Finland 30,474; Spain 27,371.
Lubricants do	[13]691,147	1,185,171	263,700	Italy 211,617; France 174,097; Japan 155,195.
Nonlubricating oils do	119	264	264	
Residual fuel oil do	86,600	22,890	--	Spain 14,039; Yugoslavia 4,862; Italy 2,664.
Bitumen and other residues do	20,834	12,847	--	Hungary 6,672; Finland 6,072.
Bituminous mixtures do	16,332	18,029	--	Finland 17,629.
Petroleum coke do	805,620	1,004,498	1,004,498	
Tars and other crude chemicals derived from coal, gas, and petroleum	49,489	65,965	--	Japan 56,500;[3] Sweden 8,852.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by the U.S.S.R., this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Metallgesellschaft Aktiengesellschaft (Metal Statistics), Frankfurt am Main, Federal Republic of Germany.

[3]Official Trade Statistics of the U.S.S.R.

[4]Excludes part of Japanese exports valued at $123,676,000.

[5]Excludes imports valued at $527,000.

[6]Less than 1/2 unit.

[7]Excludes part of Japanese exports valued at $32,005,000.

[8]Excludes part of Japanese exports valued of $7,753,000.

[9]Lead and Zinc Statistics, International Lead and Zinc Study Group, London, United Kingdom.

[10]Excludes imports valued at $63,000.

[11]Excludes exports by Australia valued at $3,064,000.

[12]Excludes imports valued at $101,000.

[13]Excludes part of Japanese exports valued at $5,009,000.

COMMODITY REVIEW

METALS

Aluminum.—In 1982, the production plan for aluminum was reportedly fulfilled. The Soviet Union increased exports of unwrought aluminum to the West and exports of rolled aluminum to market economy and centrally planned economy countries. The Soviets were dependent on imported alumina and bauxite for approximately 50% of domestic consumption. Domestic bauxite reserves were being depleted, and the Soviets were faced with increasing purchases from abroad unless greater use was made of other raw materials such as nepheline syenite for aluminum production.[16] Nepheline syenite accounted for approximately 16% of aluminum production. Less than 2% of aluminum production was from alunite.

Jamaica and the Soviet Union concluded a contract for Jamaica to supply the U.S.S.R. with 1 million tons per year of bauxite for 7 years starting in 1984 with a

preliminary shipment of 200,000 tons of bauxite in 1983. The bauxite contract was financially more advantageous for Jamaica than the earlier alumina contract.[17]

Although in 1982 the Soviet Union did not import bauxite from Brazil for the Nikolayevsk plant, in 1983 it was to import 500,000 tons of Brazilian bauxite. The Soviet Union was also engaged in a feasibility study with Greece for the construction of an alumina plant in Greece, providing Soviet technology and equipment in exchange for alumina.

During 1981-85, aluminum production was planned to increase 15% to 20%. The majority of growth was to result from completing construction of the Krasnoyarsk and Regar (Tadzhik) plants. Approximately 20% of the growth in output was to be obtained by increasing the capacity of existing potlines. Long range development plans called for a major increase in alumina production, with 26% of total growth through renovation. New bauxite deposits were also to be developed. Among these was the Severoonezhskoye deposit, which was to supply the Tikhvin alumina plant and to replace the depleted deposits in the Tikhvin area. It was also planned to develop high carbonate bauxite deposits in Kazakhstan, and to increase the pace for putting alumina production capacity into operation at the Achinsk, Kirovabad, and Nikolayevsk alumina plants. It also intended to increase production of nonmetallurgical alumina at the Pavlodar and Boksitogorsk plants.

The following developments were reported in the Soviet aluminum industry in 1982:

The first output was reported from the new potline No. 6 at the Regar (Tadzhik) aluminum plant.

At the Regar plant, along with the primary aluminum facilities, additional facilities to produce aluminum wire and rolled products were to be constructed. However, work was behind schedule for meeting the 1981-85 plan goals.

Renovation of potlines at the Bratsk aluminum plant was reported completed, and a refinery for producing aluminum of 99.99% purity was put into operation.

At the Kanaker aluminum plant, expansion and renovation of foil production facilities were underway. Large-capacity equipment was installed. When completed, 70% of the output at Kanaker was to be foil. The Sayansk aluminum plant was scheduled to go into operation in 1984. Equipment for the Sayansk plant was being supplied from the Federal Republic of Germany. Renovation of potlines was undertaken at the Kandalaksha, Novokuznetsk, and Krasnoyarsk plants.

In 1982, the fourth and final stage of the Nikolayevsk alumina plant was put into operation. Total capacity at the Nikolayevsk plant was 1 million tons per year. Part of the output was to be shipped to France as payment for equipment and technical assistance. The Kirovabad alumina plant was not being adequately supplied with bauxite, causing the plant to produce below capacity. Along with the production of alumina from bauxite, the plant produced alumina from alunite. Renovation of the Kirovabad plant was being conducted.

In Kazakhstan, in 1983, exploitation of the first stage of the Belinskiy bauxite mine and expansion of the alumina production capacity of the Pavlodar aluminum plant were to begin. Renovation of the Pavlodar plant was planned to enable it to process high-carbonate bauxite. In the southern Urals, the new Kurgazakhskaya bauxite mine was under development in the Satkinskiy Rayon in Chelyabinskaya Oblast'. Development of the Sredne-Timan bauxite deposit in the Timan-Pechora region of the European North was planned during the 1980's. The Sredne-Timan deposit was to serve as the raw material base for the planned Ukhta alumina plant in the Komi A.S.S.R. Construction of a rail link from the Sredne-Timan deposit to the site of the Ukhta alumina plant would be necessary.

Antimony.—The Kadamzhay complex in the Kirgiz S.S.R. was the principal antimony center in 1982; integrated facilities produced most of the country's refined products. Owing to technological improvements, production at the Kadamzhay complex, reportedly, more than doubled in recent years. Because of success at Kadamzhay, development of an antimony complex in the eastern part of the country was reportedly no longer necessary.[18]

Bismuth.—In 1982, the Soviet Union imported a large amount of bismuth, with reports circulating of purchases as high as 200 to 300 tons in the autumn. The U.S.S.R. planned to increase recovery of bismuth from tin and tungsten ore.

Chromium.—By 1985, the U.S.S.R. planned to increase chrome ore production to 3.8 million tons. In 1982, the domestic wholesale price of chrome ore increased 82%.

The U.S.S.R. and the Republic of South

Africa were the world's largest producers of chrome ore. The Donskoye mining and concentration complex in Khrom-Tau in western Kazakhstan produced over 90% of Soviet output and was the only supplier of high-quality ore. By 1985, the Donskoye complex was to increase production to 3.6 million tons per year. The first stage of the new Molodezhnaya Mine at Donskoye was reported to have produced its first output in March 1982. The first stage was projected to reach its design capacity of 800,000 tons with a Cr_2O_3 content of 45% to 51% by 1985; total capacity was to reach 2 million tons per year. In addition to the Molodezhnaya Mine, future plans at Donskoye called for putting into operation the Tsentral'naya Mine and a new concentration plant.

Cobalt.—Production of cobalt, along with nickel, during 1981-85 was planned to increase more than 30%. Expansion of domestic output depended greatly on the rate of development of the Noril'sk complex. In 1982, construction of the main shaft was completed at the Taymyr Mine in the Talnakh area of Noril'sk, which was projected to begin operations in the near future. Also, additional capacities were planned in 1983 for the Medvezhiy Ruchey, Oktyabr', and Zapolyarnyy Mines at Noril'sk. A deficiency of cobalt was hindering the development of the production of high-quality instruments.[19] In January 1982, there was a sharp increase in the domestic wholesale price of cobalt.

Copper.—The 1982 plan for copper ore extraction was not fulfilled.[20] During the 11th 5-year plan, 1981-85, copper production was planned to increase 20% to 25% over the 1980 level. Approximately 80% of all ore was mined in open pits.

Kazakhstan contains about one-half of total Soviet copper reserves and accounted for approximately 30% of total Soviet copper output. During 1981-85, output of refined copper in Kazakhstan was planned to increase 15.9%. During the past 10 years, the copper content of ores at mining enterprises in Kazakhstan decreased 17%.[21] Exploration work had not been successful in increasing reserves in the Dzhezkazgan and Sayaksiy regions and in Semipalatinsk Oblast' and western Kazakhstan.[22] With completion of exploration of the Aydarly site, the Aktogayskiy mining region was projected as a new ore base for the Balkhash complex.

In Kazakhstan, during 1981-85, the second stage at the Zhayremsk complex and the Annenskiy and Akchiy-Spassk Mines at the Dzhezkazgan complex were to be put in operation and the ore extraction capacities of the Achisay, East Kazakhstan, Irtysh, and Leninogorsk complexes were to increase.

In Dzhezkazgan Oblast', Kazakhstan, the 1982 plan for copper industry construction was not fulfilled, resulting in delays in mine development. In 1982, the Dzhezkazgan complex began to recover copper from slag. The additional production was declared equivalent to 6 months' output of a large mine. In 1983, extraction at the Yuzhnyy Mine of the Dzhezkazgan complex was to increase to design capacity.

Problems occurred at the Irtysh complex in Kazakhstan where the output of metal in concentrate had decreased 28% since 1970.[23] The complaint was raised that the Irtysh Mine was still not producing at even one-half of its capacity after 20 years of development.[24] At the Irtysh complex in East Kazakhstan, a smelter for producing blister copper was put into operation, but was working far below capacity owing to a number of problems, including a lack of raw materials.[25] Additional raw materials had to be shipped to Irtysh to supply the copper smelter. Three mines were in operation at Irtysh, the Irtysh, Berezov, and Byelousov. Reserves at the Byelousov Mine were being rapidly depleted; the Yabileyno-Snegirikhinsk deposit, which was prospected in 1975, was able to supply the complex, but development had not begun.[26]

Reportedly, in 1982, the capacity of the copper concentration plant at the Almalyk complex in the Uzbek S.S.R. was increased 25%. New flotation equipment was installed, and a process was developed for concentrating ore with less than 0.25% copper. As a result of improvements, production of copper in concentrate was reported to have increased 39.2% since 1970; a further increase of 40% during 1981-85 was planned.

In the Armenian S.S.R. between 1970 and 1980, production of copper concentrate increased 6.7%; copper sulfate, 14.7%; and refined copper, 5%. The Alaverdi copper complex in the Armenian S.S.R. reported having fulfilled its 1976-80 gross output plan by 102.3%. During 1981-85, the Alaverdi complex, which had a small copper powder production facility, planned to construct a much larger copper powder production plant in Akhtala. At the Agara and Zangezur complexes, during 1981-85, extraction of

copper-molybdenum ore was planned to increase approximately 10%.

In the Azerbaidzhan S.S.R., a copper alloy powder plant was to be constructed in Baku. In 1980, an experimental plant was commissioned and trial batches produced.

In the Urals during the past 10 years, copper production capacity had increased through renovating facilities rather than through developing new ones, and additional capacity was to be added in this manner in the future. A number of factors affected copper production in the Urals including depletion of deposits, a decline in ore grade, and aged production facilities. The center of production had shifted from the central Urals to the southern Urals where there was a less developed infrastructure. At the Kirovabad concentration plant, one of the oldest in the Urals, during the past 3 years the copper and zinc content of processed ore had decreased 20% to 50%, and there was an 18% to 25% increase in the amount of sulfur in the ore.[27] At the Kirovabad secondary smelter, renovation of the metallurgical plant was to increase copper production 28%. At the Sredneural'sk copper plant, flash smelting was to increase blister copper production 28%; copper recovery, 2.7%; and sulfur recovery, 19%.

Copper production was being expanded in East Siberia at the Noril'sk complex, the site of a rich copper-nickel deposit. Construction was completed at Noril'sk of the No. 5 shaft at the new Taymyr copper mine near Talnakh. At 1,500 meters, it was the country's deepest vertical shaft. Construction of the first shaft had begun in 1974. Six shafts were planned, and the first four had been put into operation. The No. 5 shaft was to be the main shaft for hoisting raw materials. Work was underway on the sixth and final shaft, and the Taymyr Mine was scheduled to begin production in the near future. New capacities were to be added in 1983 to the Medvezhiy Ruchey, Oktyabr', and Zapolyarnyy Mines at Noril'sk.

In the Soviet Far East, byproduct copper production increased 150% at the Solnechnyy complex, a major tin producer, during 1976-80; copper recovery from the ore increased 6.9% during this period at Solnechnyy. In 1982, ore extraction at the Solnechnyy complex fell short of fulfilling the plan for copper concentrate production.

In Mongolia, the Erdenet copper-molybdenum complex was projected to reach its design capacity in 1983. Erdenet, with reserves estimated at 300 million tons of ore averaging 0.85% copper and 0.0012% molybdenum, was being developed jointly by Mongolia and the U.S.S.R., along with the participation of other CMEA countries. Design capacity was 16 million tons per year of ore with 118,000 to 125,000 tons per year of contained copper and 1,000 to 1,350 tons per year of contained molybdenum. The concentrate was sent to the Soviet Union for processing.

Gold.—In April 1982, a decree was issued creating a new Soviet Oblast', the Navoi Oblast' in Uzbekistan, with the town of Navoi as its center. One of the reasons cited for the decree was the more rapid development of mineral resources. Gold mining was conducted in the Navoi area at the Murantau gold deposit by the Navoi mining and metallurgical complex. Future plans also called for increasing gold recovery from Urals ore.

In Magadan Oblast' in the Soviet Far East, where gold was being mined in the Kolyma River area, gold mining was to begin in the near future in the Chukotka region. The oldest gold-mining region in Magadan Oblast' was in the upper reaches of the Kolyma River with Susuman as the administrative center. Around it were a small group of placer mining settlements consisting of Berelekh, Shirokiy, Udarnik, Burkhala, and Pervomayskiy, where recently Bel AZ-548 trucks of 40-ton capacity had been introduced. Few of the trucks had actually been delivered, and of those delivered, many were not adapted for use in the extremely cold climate. There was also a shortage of transport vehicles for taking miners to their worksites. Freight transport problems, inadequate power supply, and a lack of spare parts were also hampering production.

In Pavlodar Oblast', Kazakhstan, the Maykainzoloto mining enterprise, which had been in operation for 50 years, began mining at an underground mine, which would considerably extend gold mining.

The production association, Soyuzzoloto, which administered national gold production, in recent years had experienced continually decreasing productivity of draglines at its enterprises. The Zabaykalzoloto enterprise was cited as an example.[28]

Gold sales in 1982 were estimated to have decreased to 200 tons. In addition to Zurich, the Soviets shipped gold for sale to London, Hong Kong, and Japan. Although the Soviet Union exported large amounts of gold, it also reported a shortage of gold along with

an increasing domestic industrial demand.[29] Many recently discharged soldiers were working in gold mines.

Iron Ore.—Production of iron ore increased slightly after decreasing in 1981. Iron ore extraction was characterized by concentrated production facilities. Eight open pits, each with a capacity of over 20 million tons per year, accounted for over 50% of output. Open pit mining accounted for about 85% of total production. Iron ore reserves in place in categories $A+B+C_1$[30] were over 60 billion tons, and total iron ore reserves were over 110 billion tons. More than 84% of crude iron ore was beneficiated. Over 95% of Soviet iron ore exports went to CMEA countries; although an iron ore exporter, the Soviet Union had problems supplying its own plants.

The largest iron ore producing region was the Krivoy Rog Basin in the Ukraine, followed by the Kursk region, the Urals, Kazakhstan, Siberia, and the Kola Peninsula. Among iron ore producing regions, the Kursk Magnetic Anomaly (KMA) was of increasing importance both in percentage of reserves and in ore extraction. The Krivoy Rog Basin was declining in importance; during the past 10 years, production there fell by approximately 25% and the metal content of the ore decreased.[31]

Although some growth in iron ore extraction was expected from basins in the Asian part of the country including the Kustanay Basin in Kazakhstan, the Angara-Ilimsk Basin in East Siberia, and the Aldansk Basin in the Soviet Far East, the principal growth in iron ore reserves was expected from the KMA. There were shortages of local iron ore for the metallurgical industry in the Urals, and over 10 million tons of ore was shipped there annually from the KMA.

The KMA produced 16% of the country's iron ore, and 40% of that was produced at the Mikhaylovskiy complex. The KMA occupied first place in iron ore reserves and second place in iron ore production. In the KMA, of total reserves in categories $A+B+C_1$, 33.7% consists of rich ore with an iron content of 59.5%, and 66.3% consists of ore with an average iron content of 35.2%. Iron ore from the KMA supplied the metallurgical industries of the Soviet European Central region and was also shipped to the northwest and the Urals. Despite its large reserves, mining at the KMA presented a number of problems. The rich ore, which is located primarily in the Belgorod region, lies at a great depth with large amounts of water. Exploitation of this rich ore awaited commissioning of mines of the Yakolevskoye deposit. A smaller amount of rich ore nearer the surface was being extracted at open pits at the Lebedi, Mikhaylovskiy, and Stoylensk complexes. The Prioskol'skoye deposit in the KMA was considered a likely candidate for future development owing to its shallow depth and its proximity to the Oskol electrical metallurgical complex.

The chief underground iron ore mining regions were the Krivoy Rog Basin in the Ukraine (approximately 60% of total underground production), and the Gornaya Shoriya in West Siberia and the Tagilo-Kuvshinskiy region of the Urals, which supplied approximately 15% each. Underground mining was conducted at about 40 mines. The majority were in the Ukraine (22), in the Urals (9), and in Siberia (6). Owing to the exhaustion of reserves at the upper levels of a number of surface mines, production would increasingly shift to mixed modes of production.

In 1982, the first stage of the Kostamush mining and beneficiation complex in Karelia was commissioned with a capacity of 8 million tons per year of ore to produce 2.9 million tons per year of pellets. The first pellet shipment was sent to the Chelyabinsk steelworks. The first stage produced 570,000 tons of pellets. The second stage was to be commissioned in 1983, and the third stage, in 1984. Kostamush would then become the country's fourth largest iron ore supplier with a capacity of 9 million tons per year of pellets from 24 million tons per year of ore. The Kostamush complex was being built with the aid of Finnish companies; mining of iron ore on a limited scale had started at Kostamush in 1980. The deposit contains an estimated 1.2 to 1.5 billion tons of ore with an average iron content of 31%. Finland was to buy annually up to 1.2 million tons of pellets during 1983-90.

In 1982, the new concentration plant at the Lebedi complex produced its first output. The Lebedi complex was to be the major raw material supplier to the Oskol electrical metallurgical complex, which was under construction.

Soviet production of marketable iron ore was planned to increase to 274 million tons per year by 1985. The percentage of ore beneficiated was to increase from 84% in 1980 to 90% in 1985. Production of pellets was to increase 40% in comparison with that of 1980 to 72.7 million tons. Facilities

were to be commissioned at the Kachkanar, Kostamush, Stoylensk, Lebedi, and Mikhaylovskiy mining and beneficiation complexes.

Iron and Steel.—In 1982, the Ministry of Ferrous Metallurgy did not meet its planned targets. Production of crude steel, pig iron, rolled steel, and steel pipe decreased in comparison with those of 1981. Although the Soviet Union was the world's largest producer in total quantity of iron ore, coke, refractories, raw steel, and steel pipe, it was dependent on imports for high-quality steel products. Wasteful use of steel also limited resources. During 1981-85, over 40% of the growth in rolled steel production was to be obtained through eliminating waste. Eleven metallurgical enterprises were responsible for more than one-half of the nation's output of raw steel. The largest producer was the Magnitogorsk complex.

In 1985, in comparison with that of 1980, production of raw steel was planned to increase 14% to 169 million tons per year; finished rolled steel, 15% to 118 million tons per year; pig iron, 10% to 118 million tons per year; and steel pipe, 21% to 21.9 million tons per year, with a 50% increase in large-diameter steel pipe. The Ministry planned to increase scrap processing 21%.

During 1981-85, capital investment in iron and steel production was to increase approximately 40% over that of 1976-80. The share of oxygen converter steel was to increase from 28% to 33% of total production. Electric steel, which in 1981 accounted for about 11% of production, was to account for about 14% in 1985. Open-hearth production will remain the mainstay, with its share of output falling to 52% in 1985, compared with 60% in 1980. Long-range plans for the year 2000 envisaged the elimination of open-hearth production.

In 1985, continuous cast steel production was to increase to 23% of total output from 11% in 1980. The Soviet Union, however, had fallen far behind its original plans for the introduction of continuous casting. In 1983, about 1.1 million tons of continuous casting capacity was to be added.

Plans for 1985 called for 70% of the increase in pig iron production to come through technical improvements, notably by higher blast temperatures and better iron ore preparation. The plan called for 93.5% of pig iron production to be converted into steel compared with 91% in 1975.

The 1981-85 plan called for a threefold increase in the production of iron and steel powder. The large increase was to be based on a process to produce powder from scrap. A minimum of three powder plants was to be built. The first, the Tula works, was commissioned in late 1981, with a high proportion of its output being alloy powder. A second powder plant was to go into operation in 1983. The third powder plant was being built in Strezhevoy in Tomsk Oblast', Siberia.

Many metallurgical plants consumed unnecessarily large amounts of pig iron in steelmaking, and this was attributed to scrap shortages.[32] To ensure fuller use of scrap during 1981-85, small-capacity electric steel plants were to be built at scrap collection sites. In 1982, the Soviet Union signed a contract with Voest-Alpine AG of Austria and the Italian firm Danieli S.p.A. for construction of one such turnkey works at Zhlobin in Byelorussia. The works was scheduled to come into operation in December 1984 and was to consist of two ultrahigh power electric arc furnaces of 100 tons each, two six-strand continuous billet casters, and a 500,000-ton-per-year combined bar, rod, and section mill. Many of the facilities for these works were to be supplied by subcontractors.

At the Oskol electric metallurgical complex, the first stage of a pelletizing plant was put into operation with a capacity of 2.43 million tons per year of direct-reduction-process pellets for steelmaking. Raw material was supplied by the Lebedi mining and beneficiation complex via a 27-kilometer slurry pipeline. Steel production was scheduled to begin at the Oskol complex in 1983.

In 1982, the first output was reported from the new No. 5 electric furnace at the Chelyabinsk steel plant. Electric furnace capacity was also being increased at the Kuznetsk complex. At the Orsk-Khalilovo complex in Orenburg Oblast', four electric furnaces were to be installed. Furnace No. 1, with a capacity of 250,000 tons per year, was put into operation in 1981, but in 1982, problems occurred with the operation of this furnace. The Yermak ferroalloy plant in Kazakhstan put electric furnace No. 64 into operation with a capacity of 90,000 tons per year of ferrosilicon. Expansion of ferromanganese capacity was occurring with the purchase of six 120,000-ton-capacity electric furnaces from Japan, which were being installed during 1980-83 at the Nikopol plant in the Ukraine and the Zestafoni plant in Georgia.

In 1982, at the Dneprovskiy steel mill,

named in honor of Dzerzhinskiy, in the city of Dneprodzerzhinsk, a new oxygen converter shop was put into operation. At the Cherepovets steelworks, the No. 5 blast furnace with a volume of 5,500 cubic meters and a capacity of 4.5 million tons per year of pig iron was still under construction. It was planned to go into operation by 1985 and was to be the country's largest blast furnace. In 1982, at the Novolipetsk complex, a cold-rolling shop was put into operation.

At the Nizhniy Tagil complex, the first output was reported from the second stage of a universal beam mill with a capacity of 600,000 tons per year. At the Karaganda complex, the first stage of a tinplate shop was put into operation with a design capacity of 445,000 tons per year. When full capacity production was achieved from the first stage, tinplate output in the U.S.S.R. was planned to increase 50%. Final capacity of the tinplate shop was to be 750,000 tons per year. Projected tinplate output at Karaganda in 1983 was 110,000 tons.[33]

In 1982, at the Khartsyzsk pipe plant in the Ukraine, a new shop, with a capacity of 760,000 tons per year, went into operation for producing corrosion-resistant pipe. Khartsyzsk was to be a major pipe supplier for the trans-Siberian gas export pipeline. The West German firm Mannesman Demag AG assisted in the construction of a new shop at the Vyksa pipe plant for the production of multilayered pipe for gas transport; the first of four identical stages of 250,000 tons per year was put into operation. Despite increased pipe production, the U.S.S.R. will remain a large importer of steel pipe through 1985.

Lead and Zinc.—The lead and zinc industry was troubled by slow construction of new facilities, supply problems, and low metal recovery. Still, the Ministry of Nonferrous Metallurgy declared that there had been a significant increase in lead production in recent years.[34] The 1982 plan for the production of zinc concentrate was reportedly fulfilled. During 1981-85, 100% of the growth in lead production and 65% of the growth in zinc production was planned to come through expanding and renovating existing facilities.

In the U.S.S.R., 51% of lead was consumed in transportation; 17%, in electrical engineering; 8%, in machine building; 15%, in the chemical industry; and 9%, in other branches of industry in 1982.[35] Lead from batteries accounted for about 70% of secondary lead production. The domestic wholesale price of lead and zinc increased sharply.

Kazakhstan produced over 70% of the Soviet lead and approximately 50% of the Soviet zinc. The 1981-85 plan for Kazakhstan called for lead production to increase 11.6% and zinc production, 7.7%. Inadequate investment was faulted for the slow development of lead-zinc resources in Kazakhstan; of a projected 78 million rubles needed to develop these resources since 1977, only 15 million rubles had been allocated.[36] In the last 10 years at mining enterprises in Kazakhstan, the content of lead in ore had decreased 29% and of zinc in ore, 47%.[37] During 1981-85, production of lead was planned to increase 12% and zinc, 12.7%, at the Ust'-Kamenogorsk lead-zinc plant in Kazakhstan. In 1982, shortages of concentrate were reported at Ust'-Kamenogorsk. In Dzhezkazgan Oblast', where the Zhayremsk and Achisay complexes were located, plans were to increase the production of lead-zinc ore 53% during 1981-85. The Dzhezkazgan copper complex produced byproduct lead, and lead-in-concentrate output was to increase 22% during 1981-85. Expansion was underway at the Zyryanovsk and Tekeli lead-zinc complexes. The Zyryanovsk complex was experiencing a shortage of ore.[38] At the Grekhovskiy Mine of the Zyryanovsk complex, which had been in operation more than 25 years, an underground crushing complex was under construction. A surface mine at the same deposit was being developed along with construction of a pipeline to the concentration plant. These improvements were projected to increase ore extraction a minimum of 50% by 1985. The potential exploitation period for the Zyryanovsk deposit was extended 15 to 20 years with the detection of five new mining areas.

The Zhayremsk complex was the newest lead-zinc-producing enterprise in Kazakhstan; at Zhayremsk, output of lead and zinc was to increase 45% and 40%, respectively, during 1981-85 in comparison with that of 1976-80. Extraction of ore at the complex was to increase 50%. Construction was behind schedule at Zhayremsk, and this was foreseen as affecting commissioning of the second stage. At the Zhayremsk complex, capacity was being added at the Dal'nyezapad Mine and development was underway at the new Ushkatyn Mine. An experimental concentration plant was scheduled to begin operations in 1982 to work on methods to solve problems in proc-

essing ore constituents. Construction of a large industrial concentration plant based on the experimental plant was scheduled to begin in 1984. A major problem for ore extraction at Zhayremsk was excess water in the pits, resulting in the ore freezing in winter. Plans to improve operations entailed acquiring more equipment including water pumps, 8-cubic-meter shovels, and 40- and 75-ton dump trucks. By 1985, a concentration plant was to be commissioned at the Zhayremsk complex along with new capacities at the Dal'nyezapad Mine and the Ushkatyn open pit. Failure to commission concentration facilities at the Zhayremsk and Kargayly complexes in Kazkhastan resulted in ore being shipped hundreds of kilometers for processing. The commissioning of concentration facilities at these complexes was deemed essential to overcome this problem.

In the Urals, at the Kirovabad concentration plant, which was one of the oldest in the Urals, during the past 3 years, the copper and zinc content of processed ore decreased 20% to 50%, and the sulfur content increased 18% to 25%.[39] In the Soviet Far East, the first output was reported from the Nikolayevsk lead-zinc mine in the Maritime Kray; this was to be one of the largest and deepest mines of its kind. The first stage of the mine was declared in operation in 1980 and was scheduled for completion in 1984. Ore at the Solnechnyy tin-mining complex in Khabarovsk Kray in the Soviet Far East contains significant quantities of lead and zinc, and byproduct lead and zinc production began during 1976-80. Based on reserves, it was considered feasible to greatly increase production at the Solnechnyy complex.

Magnesium.—The Ust'-Kamenogorsk titanium-magnesium metal complex in Kazakhstan fulfilled its goal for magnesium production in 1982, and production of magnesium was to increase 40.7% at Ust'-Kamenogorsk during 1981-85. For this purpose, new capacities were to be put into operation.

Manganese.—Expansion of the manganese industry during 1981-85 was to occur through expansion of existing enterprises as well as the construction of new enterprises. By 1985, production was to increase to 10.1 million tons of manganese ore.

The Nikopol Basin in the Ukraine was the principal Soviet manganese production region, producing about two-thirds of Soviet manganese ore. The ore, however, has an average grade of only 26.4% manganese, is 2 to 3.5 meters thick, and lies under about 80 meters of overburden. In the Nikopol Basin, the Marganets complex mined the eastern sector and the Ordzhonikidze complex mined the western sector. In the Ukraine, in 1981, the Ordzhonikidze complex was reported to have produced 3.2 million tons of manganese ore, and the Marganets complex, 3.1 million tons. In 1982, at the Grushevskiy open pit at Marganets, a rotary excavator with a capacity of 5,000 cubic meters per hour of material was put into operation.

The richest Soviet manganese ore had been mined at the Chiatura Basin in the Georgian S.S.R., but rich ore from this deposit was mostly depleted. Mining operations were concentrated on leftover and lower grade ore. The Chiatura complex consisted of six mining enterprises and nine concentration plants. The Chiatura complex was reported to have produced about 2.7 million tons of manganese ore in both 1981 and 1982. In 1982, a new open pit with a capacity of 100,000 tons per year was put into operation at the Chiatura complex.

Other areas with some manganese production included Kazakhstan and the Urals. In Dzhezdinskiy Rayon in Dzhezkazgan Oblast', Kazakhstan, development of the new Tsentral'naya Mine at the Dzhezdinskiy mining enterprise was reportedly completed, but the mine had not yet gone into operation. The new mine, with a 250-meter shaft, was connected with the old mine to form one large underground complex. When the new Tsentral'naya Mine reached full capacity, extraction at Dzhezdinskiy was projected to triple. An open pit at Dzhezdinskiy had been depleted for a long time, and an underground mine developed in 1973 was not supplying sufficient ore for the concentration plant to work at full capacity.

Growth in manganese output during 1981-85 was to come from poorer and harder to concentrate carbonate ores. In 1981, development of the Bol'shoy Tokmak carbonate ore deposit in the Ukraine began, and the first shaft was sunk. The Bol'shoy Tokmak deposit was even lower grade and deeper than the Nikopol deposit and was to serve as the base for the construction of the Tavricheskiy mining and concentration complex in Zaporozh'ye Oblast'. The Soviet Union was also greatly expanding its electric furnace ferromanganese capacity based on a contract signed with Japan in 1977 to

supply six 120,000-ton-capacity electric furnaces. Delivery began in 1980 and the last furnace was scheduled to be installed in 1983. The furnaces were to be installed at the Nikopol plant in the Ukraine and the Zestafoni plant in Georgia.

Mercury.—The largest Soviet mercury operation was the Khaydarkan complex in southern Kirgiziya, where mercury was mined by both underground and open pit methods. The Khaydarkan complex comprised four underground mining enterprises, one open pit, a concentration plant, and three metallurgical plants. Development of mining enterprise No. 3 was continuing at the Novoye deposit. At the new Uluu-Too mining enterprise, the 685-meter-deep Glubokaya Mine and the 865-meter-deep Tsentral'naya Mine were being developed with surface facilities for both at Glubokaya. The 1982 plan for expanding reserves at the Khaydarkan complex was successfully fulfilled. In May, Khaydarkan was affected by an earthquake but work was said to have resumed.[40]

The Nikitovskiy complex in the Ukraine was the second largest mercury producer. Approximately 70% of the ore was mined by underground and 30% by surface methods. Two underground mines, Second Novaya and Novozavodskaya, and the Polukupol open pit were in operation. Economic reserves of mercury at Nikitovskiy were located in two 60- to 80-meter seams of sandstone. Mining was conducted simultaneously on five levels at a depth of 210 to 450 meters.

The small Zakarpatskiy complex in Zakarpatskaya Oblast' in the western Ukraine processed ores from the Borkutnoye, Shayanskoye, and other small deposits. In the Tadzhik S.S.R., construction of the new Dzhidzhikrutskiy (Aznob) mercury-antimony complex was underway. Future development was planned of small deposits in the North Caucasus, at Chukotka in Magadan Oblast', and in other regions.

Molybdenum.—The 1982 production plan for molybdenum concentrate was reportedly fulfilled. The United States ceased exports of molybdenum concentrate to the U.S.S.R. The U.S.S.R. was a net importer of molybdenum with the majority of imports coming from Mongolia.

In Armenia, between 1970 and 1980, production of molybdenum concentrate increased 32%. At the Zangezur and Agara complexes in Armenia, during 1981-85, output of copper-molybdenum ore and molybdenum concentrate was planned to increase approximately 10%. Output of molybdenum in Armenia was projected to increase with the renovation of the Zangezur complex. During the first 7 months of 1982, the Zangezur complex reported fulfilling its production goal.

Construction of the Zhireken molybdenum complex in Chita Oblast', north of Mongolia, was being conducted. In Kazakhstan, the Akchatau mining and metallurgical complex produced tungsten-molybdenum ore; mining and processing capacities were reportedly increased, including the new Dzhambul underground mine and concentration plant. The new concentration plant was to employ technology for recovering a range of ore constituents.

The Erdenet open pit copper-molybdenum complex in Mongolia, which was being jointly developed by the U.S.S.R. and Mongolia, had an annual projected capacity of over 1,000 tons of molybdenum metal in concentrate. The ore at Erdenet averaged 0.85% copper and 0.012% molybdenum, and the concentrate from Erdenet was shipped to the U.S.S.R. for processing. In 1983, Erdenet was scheduled to reach design capacity. Workers from East European CMEA countries were also participating in the development of Erdenet, and their countries were probably receiving molybdenum processed in the Soviet Union. The Erdenet project should reduce Soviet dependence on molybdenum from outside the CMEA countries.

Nickel.—The 11th 5-year plan, 1981-85, called for nickel production to increase by not less than 30%. In 1982, the increase in nickel production was mainly attributed to production at the Noril'sk complex. At Noril'sk, the Nadezhda flash smelter, with a capacity of 550,000 tons per year of nickel concentrate and built with Finnish equipment and technology, was put into operation at the beginning of the year.

A new nickel production facility was also put into operation at the Severonikel complex on the Kola Peninsula, which reportedly about doubled the capacity of the complex. Raw material was provided from local mining and beneficiation operations in Murmansk Oblast' and also from Noril'sk via a North Sea route. The new facility would help alleviate the backup in processing Noril'sk ore. Both the Severonikel complex and the Pechenga nickel complex, also on the Kola Peninsula, had accumulated surplus inventories of material from Nor-

il'sk. Efforts to increase ore reserves on the Kola Peninsula had not been successful. In 1982, Pechenga reported exceeding its production goal for 1981 and 1982, the first 2 years of the 11th 5-year plan, for extraction of ore by 0.3% and for production of nickel in concentrate by 1.5%.

In 1982, at the Noril'sk complex, construction was completed of the country's deepest vertical mine shaft at the new Taymyr copper-nickel mine near Talnakh. The new shaft, over 1,500 kilometers deep, was to be the main shaft for hoisting raw materials. Construction of the first shaft at the Taymyr Mine began in 1974. Six shafts were planned, and four shafts had been put into operation. Work was underway on the last shaft, and production was planned in the near future.

The U.S.S.R. again increased its nickel exports to market economy countries. Soviet nickel sales at low prices to hard currency markets were blamed, in part, for depressed nickel prices. The Soviet Union denied the charge that it was increasing nickel exports and selling at low prices, stating that its selling price was in line with world market prices. The level of Soviet nickel exports was not clear, with estimates from various Western sources ranging from 20,000 to 75,000 tons. In 1982, total Soviet nickel exports to market and centrally planned economy countries were estimated by the U.S. Bureau of Mines at 46,000 tons, including production from Cuban matte refined in the U.S.S.R.

In December, the European nickel producers filed a complaint with the EEC charging dumping of refined nickel by the U.S.S.R. in Europe. The complaint stated that Soviet exports to the EEC of cut and uncut cathodes increased from 13,100 tons in 1981 to 19,050 tons in the first 9 months of 1982, representing an increase of from 9% to 18.5% of the EEC market. There was a particularly sharp rise in Soviet shipments of uncut cathodes to the European market; a portion was cut by traders and the remainder used without further processing. The complaint claimed that the impact on the EEC nickel industry was to reduce production by 34%, capacity utilization by 16%, and employment by 1,440 jobs. The Soviets were prepared to counter the charges, and the EEC determined that a further investigation was warranted.

Platinum-Group Metals.—Output of platinum-group metals (PGM) was being steadily expanded. The U.S.S.R. was one of the world's largest producers and exporters of PGM, and Soviet ore reserves are adequate for increasing production and exports for many years. In the U.S.S.R., PGM production was about 67% palladium and 25% platinum, a palladium-to-platinum ratio of 2.7 to 1.

Virtually all PGM were produced as byproducts, with 75% coming from Noril'sk. The major increase in PGM production was to come from Noril'sk and from Krasnoyarsk, the world's largest PGM refinery, which treated electrolytic slimes from Noril'sk. Early in the year, nickel and copper smelting facilities were commissioned at the Nadezhda complex at Noril'sk where mine development was also to accelerate. The No. 5 shaft, the main shaft for hoisting material, was completed at the Taymyr copper-nickel mine near Talnakh. Work was underway on the No. 6 shaft, which was to be the last, and production from the Taymyr Mine was projected to commence in the near future.

Some Western quarters predicted that the Soviets intended to reduce shipments of palladium to the West by 25% or more in 1983, and added that the Soviet Union was changing its contractual arrangements and pricing formulas; the price of palladium consequently rose sharply in the West.

Silver.—The Western press reported that the Soviet Union purchased as much as 10 million troy ounces of silver in late 1982. The Soviets had been a net importer in 1981 with imports estimated at 1 million troy ounces. The amount of the 1982 Soviet purchase, the origin or origins of the shipment, and even whether the purchase actually occurred were subjects of speculation. The reputed Soviet silver purchase was credited, in part, with the increase in the price of silver that occurred at the time. Speculation in the Western press was that the purchases were for strategic reasons or to help boost the price of gold indirectly, thus improving Soviet gold earnings. The Soviet Union reported shortages of silver and an increasing domestic industrial demand.[41]

Tin.—By the mid-1980's, tin output was projected to reach 40,000 tons, based on new production from existing or developing mines in the Soviet Far East and Central Asia. However, a number of tin enterprises were experiencing a shortage of reserves. Despite Soviet policy to achieve self-sufficiency in mineral production, tin output continued to be inadequate, and imports

accounted for over 30% of requirements. The Soviet Union refused to subscribe to the Sixth International Tin Agreement worked out by tin producing and consuming nations, which was to go into effect in July 1982, although the Soviet Union had been a party to earlier accords.

The largest tin producing region was the Soviet Far East. The Solnechnyy mining area in Khabarovsk Kray in the Soviet Far East was undergoing expansion; tin production was to increase 150% based on available reserves. The Pereval'nyy Mine was under development. Newly explored reserves, reportedly, would compensate for those being depleted and would provide for increased production. Areas under exploration included the Sobolinoye site and the Badzhal'skiy region located 40 and 200 kilometers, respectively, from the village of Solnechnyy. Ore at the Solnechnyy complex also contains significant quantities of bismuth, copper, lead, silver, tungsten, zinc, etc. Between 1976 and 1981, recovery of tin in ore at the complex increased 21.7%. In 1982, the Solnechnyy complex was not fulfilling its plan for tin ore extraction, and there was insufficient ore for the concentrator. Delays in construction of surface facilities at the Molodezhnaya Mine were blamed. Problems had been occurring for several years in developing capacities at this mine.[42]

Construction of a tin complex during 1981-85 was being planned in the Kirgiz S.S.R. on the Sary-Dzhar River not far from the village of Inylchek. The Soviet Union was assisting tin development in Vietnam and Laos, and imported tin from these countries as payment.[43]

Titanium.—The 11th 5-year plan, 1981-85, called for an increase in titanium production. The industry continued to be based mainly on Siberian ilmenite and rutile. The ilmenite contains between 50% and 69% TiO_2. The Soviet Union exported titanium to the West. In 1982, the United States imported Soviet titanium sponge, billets and ingots, and waste and scrap, but there had been a sharp decline in U.S. imports during the past 5 years.

The Ust'-Kamenogorsk titanium-magnesium complex was the only titanium producer in Kazakhstan; a 16-year-old enterprise and one of the country's largest, it planned to increase titanium production 27.1% during 1981-85. Ust'-Kamenogorsk was reported in November 1982 as overfulfilling its plan. Still, serious problems were occurring in the raw material supply, which had to be shipped to the plant from the Urals, the Ukraine, and abroad, even though the large Karaotkelsk deposit was located in the same Oblast'. Resources at Karaotkelsk were declared sufficient for operation of Ust'-Kamenogorsk for a century at an expanded rate of production, but development was delayed, owing to lack of investment funds.[44] Failure to extract and process titanium in the Kola Peninsula was criticized because of a stated need for titanium, although the necessary processing technology had been developed. Problems were attributed to lack of coordination among the responsible ministries.[45]

Tungsten.—Soviet tungsten production was again insufficient for domestic needs. Lack of tungsten was blamed, in part, for inhibiting the development of high-quality instruments.[46] The Soviets were rumored to have arranged purchase of 1,750 to 2,000 tons of tungsten concentrate for the first quarter of 1983.

The tungsten-molybdenum capacity was reportedly increased at the Akchatau complex in Kazakhstan. The new Dzhambul underground mine and a concentration plant were put into operation; the new concentration plant was to recover a number of ore constituents.

In 1982, the Tyrny-Auz complex in the North Caucasus performed below its target for overburden removal and recovery of metal in concentrate;[47] the concentration plant was to be renovated.

Tin ore at the Solnechnyy complex in Khabarovsk Kray in the Soviet Far East contains significant quantities of tungsten. During 1976-80, the Solnechnyy complex increased tungsten production 12% and between 1976-81 increased tungsten recovery in ore 7.4%. Newly explored reserves at the Solnechnyy complex were reported to be double the size of those being depleted.

In 1982, the Iul' tin-mining and concentration complex in the Soviet Far East reported fulfilling its plan for tungsten mining, but the complex did not fulfill its annual production plan.

Minor Metals.—The national production plan for rare metals was reportedly fulfilled. The Soviet Union possesses commercial deposits of all the metals that have assumed importance in modern rocketry, aircraft, and nuclear energy. There was a reported substantial increase in the production of rare metals during 1976-80. Explored reserves were considered adequate to ensure

the planned rate of growth for all rare metals during 1981-85. The limiting factor in increasing production of rare metals was construction delays. Discoveries from the exploration of the Verkhne-Kayraktinskoye deposit in central Kazakhstan, reportedly, would greatly increase Kazakhstan's share in rare metal extraction.

During 1981-85, the production of rare metals was to double in East Kazakhstan Oblast'. The Belogorskiy polymetallic complex in East Kazakhstan Oblast' had experienced a decreasing volume of ore production owing to diminishing reserves; it was reported necessary to increase the rate of utilization of capacities and to more rapidly put new capacities into operation. The complaint was raised that the Belogorskiy complex lacked adequate equipment for making planned increases in the production of rare metals.[48]

NONMETALS

The Soviet Union produced a wide variety of nonmetallic minerals and was an exporter of many of these including asbestos, diamonds, and potash. Nevertheless, the Soviet Union was a net importer of nonmetallic minerals such as barite, fluorspar, mica, and talc.

Asbestos.—The Soviet asbestos industry was the largest in the world. Over one-half of the production came from the Uralasbest complex in the central Urals, and over one-fourth of the output came from the Dzhetygara deposit in Kustanay Oblast', Kazakhstan. Other important producers included the Tuvaasbest complex in the Tuva A.S.S.R. in East Siberia and the Kiyembay complex in Orenburg Oblast' in the southern Urals.

At the Uralasbest complex, in 1980, three open pits mined 149 million tons of ore and overburden, producing approximately 1.19 million tons of marketable asbestos. In 1981, ore mining increased to a total of 173 million tons of ore and overburden, but production of marketable asbestos decreased to 1.16 million tons because of reduced ore grades. In 1982, production was estimated to have stayed the same because of the reduced grades. Construction of the No. 7 concentrator, with a capacity of 340,000 tons per year was planned. Three concentrators, Nos. 4, 5, and 6, were in operation. Ore reserves of Uralasbest reportedly contain 56.3 million tons of asbestos fiber in 2,362 million tons of ore and were considered adequate for 70 to 80 years.

Construction of the Kiyembay complex in Orenburg Oblast' in the southern Urals was started in 1968 and continued in 1982. CMEA countries had a one-third interest in the project and were assisting in the construction. Design capacity was 500,000 tons per year of grades III and IV from 24 million tons of ore with an average grade of 4.4%. The project was being developed in two stages of 250,000 tons per year each. The first stage was commissioned in December 1979 and was estimated to have produced 160,000 tons in 1982. The second stage was commissioned in 1980 and was estimated to have produced 100,000 tons in 1982. One-third of the output of the Kiyembay complex was to be exported to the participating CMEA countries in return for their investment.

At the Sayan asbestos deposits on the border of Krasnoyarsk Kray and the Tuva A.S.S.R. in East Siberia, reserves are estimated at 7 million tons of asbestos. The asbestos lies at a comparatively shallow depth and was planned to be mined by open pit methods. Development was underway of the Lenin complex at this deposit, with a capacity of 200,000 tons per year.

Barite.—A large percentage of the country's barite consumption was imported, mainly from North Korea, Yugoslavia, and Bulgaria. As a result of the commissioning of facilities at the Vars lead-zinc complex in Yugoslavia, Yugoslav exports of barite to the U.S.S.R. increased. The Zhayremsk area in Kazakhstan, reportedly, is extremely rich in barium sulfate, with approximately one-fourth of the world's reserves. More than 40% of the barite ore could be surface mined. In addition, rich deposits of barite were reportedly discovered in the Komi A.S.S.R., and development was underway of a 45,000-ton-per-year complex in Khaishi, Georgia. Discussion was underway concerning development of a barite mining and enrichment complex in Abkhaziya in the Georgian S.S.R. Design work had been prepared for renovation of the Uchaly concentration plant in the Urals to obtain barite from copper ore from the Molodezhnoye and Uzelginskoye deposits.

Diamond.—During the first 2 months of 1982, despite depressed diamond prices, reported Soviet exports of polished diamonds by the Soviet-Belgian company Almazyuvelierexport of 97,000 carats were exceeding the rate of 1981 exports. However, in March 1982, the EEC countries reduced Soviet diamond imports by 25%, in line with

sanctions to limit imports of luxury goods from the Soviet Union. Workers at the Yakutsk diamond association, Yakutalmaz, reportedly increased the volume of overburden removal by about 5 million cubic meters during the year.

Fluorspar.—The Soviet Union remained a net importer of fluorspar, with imports providing over one-half of domestic consumption. Mongolia in the past 5 years had doubled its fluorspar exports to the U.S.S.R.[49] In 1982, the Abagaytuy mining directorate and the concentration plant at the Kalaguy fluorspar complex reportedly exceeded their yearly production goal by 1,100 tons of fluorspar.

Mica.—Mica output was inadequate to meet demand, and strategic-grade mica was imported from India. The 1981-85 Soviet-Indian Trade Agreement had provided for increased mica imports. In 1982, the U.S.S.R. signed another agreement for delivery of Indian mica.

The Aldan mica complex in southern Yakutia, which went into operation in the 1960's, had been decreasing in importance owing to the development of the large Kovdor mica complex and the development of synthetic substitutes. However, large-dimension crystals of phlogopite were extracted at the Aldan deposit, and these are not present at Kovdor. Therefore, development of the Aldan mica complex was considered necessary to help satisfy future demand for this material.

The U.S.S.R. suffered a shortage of mica for insulating purposes, for which the demand was projected to increase 20% to 25% every 5 years. The Soviets were utilizing techniques to produce built-up mica from scrap.

The built-up mica was helping to alleviate the mica shortage and was more labor efficient to produce. Owing to the introduction of built-up mica, 21,000 jobs were eliminated in electrical-grade mica production. The built-up mica was considered of better quality than sheet mica for electrical insulation and enabled the U.S.S.R. to reduce mica consumption.

Nitrogen.—During 1981-85, a total of 20 ammonia synthesis plants were to be put into operation with 200,000 and 450,000 tons per year capacities. In 1982, a 450,000-ton-per-year urea unit and a 450,000-ton-per-year ammonium nitrate unit were put into operation at the Kemerovo nitrogen association in West Siberia. In addition, the Soviet Union contracted with Czechoslovakia for four new urea plants, each with a 1,000-ton-per-day capacity. Two of the new plants were to be built at Odessa, and the other two at Grodno and Dzerzhinsk. Soviet urea was very competitive in the U.S. market owing to its low price.

Phosphate Rock.—Plans for 1985 called for extraction of 53.2 million tons of apatite ore to produce 19 million tons of apatite concentrate and for extraction of 32.1 million tons of sedimentary rock ore. The average annual rate of depletion of explored apatite reserves was 11.25% and of sedimentary rock reserves, 7.6%.

The main centers for phosphate production were the Apatit Association on the Kola Peninsula and phosphorite deposits at Karatau in Kazakhstan. The Chilisay phosphorite basin in Aktyubinsk Oblast', Kazakhstan, was under development and was to be a major center of phosphorite production. Generally low-grade deposits of phosphorites also occur in Verkhnekamsk in the Urals, at Yegor'yevsk and Lopatino in Moscow Oblast', Polpinskoye in Bryansk Oblast', Maardu in Estonia, and other regions. Apatite concentrate provided the large majority of all phosphate production. During 1981-85, the output of mineral fertilizers was planned to increase 50%, and the most rapid growth was to be for phosphorus fertilizers.

The largest single phosphate source was the Khibiny apatite-nepheline deposit on the Kola Peninsula. Mined ore averaging about 16% was upgraded to 39.4% to 39.6% P_2O_5.

At Karatau, the other major source of phosphates, there were 46 deposits, only 5 of which were being worked. Four deposits were being surface mined, and at one, the Chulaktauskoye, there was underground mining, and the role of underground mining was to increase.

At the Apatit Association on the Kola Peninsula, 19 million tons of concentrate was to be produced by 1985 from 54 million tons of apatite ore. The Vostochnyy mining enterprise of the association, which was to consist of the Koashva and N'yurkpakhk open pits, was being developed. Production at the Vostochnyy enterprise was planned to switch from surface to underground mining after the upper layers were depleted. Capacity at the Vostochnyy enterprise had reached 5.6 million tons of ore and was planned to exceed 8 million tons by 1985.

At the Apatit Association in 1982, capacity was commissioned at the Tsentral'naya

Mine for extraction of 600,000 tons per year of apatite-nepheline ore, raising total mine capacity to 22.6 million tons per year of ore. Plans were to increase capacity at the Tsentral'naya Mine to 25 to 26 million tons per year. At the Yuksporskiy Mine, capacity was projected to increase to 13.2 million tons per year upon putting the second stage into operation. Capacity was to be 6 million tons per year at the Nizhniy (lower) Yukspor and 7.2 million tons per year at the Verkhniy (upper) Yukspor sites. In the future, capacity of the Rasvumchorskiy Mine was to increase to 6.2 million tons per year, and capacity at the Kirovskiy Mine was to increase to 12 million tons per year.

In 1982, at the Apatit Association, the first stage of the No. 3 concentration plant was under construction, with a capacity of 1.3 million tons per year of concentrate. The first stage was scheduled to go into operation in 1984, with a subsection of the first stage to go into operation in 1983. The full design capacity of the No. 3 concentration plant was to be 28 million tons per year of ore and 8.8 million tons per year of concentrate.

At the Kovdor iron ore complex on the Kola Peninsula, an apatite concentration plant processed tailings from the main iron ore beneficiation operations of the complex. Production at Kovdor in 1982 was reported as 694,000 tons of apatite concentrate. Plans for 1983 called for producing 744,000 tons of apatite concentrate.

In 1982, planned output at the Karatau Association was 8.6 million tons of ore. The majority of the ore was intended for production of elemental phosphorus, but a sizable remainder was ground into phosphate flour for direct application. Future plans called for ore output at the Karatau Association to increase to 30 to 35 million tons per year. Open pit mining at the Karatau Association was to stabilize at about 20 million tons per year. By 1985, the first stage of the Kok-Su open pit was to begin operation.

During 1981-85, development of new underground mines to compensate for decreasing production from the open pits at Karatau was to begin. In addition, the P_2O_5 content of the ore was expected to decrease and the ratio of concentration to increase. Development had begun of an underground level at the Aksay Mine, which was being operated as an open pit with an annual production of 2 million tons per year. The first underground mining was scheduled for 1985. Production from the Aksay underground mine was to be 1 million tons per year of sedimentary rock ore.

At other sedimentary rock deposits, production at Yegoryevsk reached 8.5 million tons per year of ore averaging 12.5% P_2O_5, and at Polpinskoye, 2.3 million tons per year averaging 6.5% P_2O_5. The ore was enriched by washing, and the P_2O_5 content of the phosphate flour averaged 19% to 21%. The average P_2O_5 content of reserves at Verkhnekamsk was 11.9%. Production of ore from open pits at Verkhnekamsk reached 2.3 million tons per year, and annual production of phosphate flour reached 620,000 tons per year of 22% P_2O_5 content. At the Kingisepp Association Fosforit in Leningrad Oblast', open pit extraction reached 6.3 million tons per year of ore. Using flotation concentration, up to 1 million tons per year of concentrate was produced with a P_2O_5 content of over 30%.

During 1981-85, development of phosphorites was planned in the Aktyubinsk Basin in Kazakhstan. At the Chilisay deposit in the Aktyubinsk Basin, development of an open pit mining and concentration complex began in 1974. The first part of the first stage of the complex with a capacity of 700,000 tons per year of concentrate was scheduled to go into operation in 1985. The entire first stage was to have been in operation by then with a capacity of 2.8 million tons per year of concentrate. Reserves were considered adequate for 100 years. A shortage of workers, among other things, had slowed development.[50]

Projected annual capacity of the Seligdar apatite complex in southern Yakutia was 4 to 5 million tons P_2O_5, but work was still underway for developing technology for processing the ore. At Seligdar, a new mine was to be put into operation. Other new mines planned were at the Novopoltavskoye apatite deposit in the Ukraine and at the Rakverskoye site in Estonia.

The most acute shortage of phosphatic fertilizer was in Siberia and the Soviet Far East. When both the Transbaykal complex, which was to be based on the Oshurkovo deposit, and the Belaya Zima deposit are developed, these will provide still only 30% to 35% of the need for phosphatic fertilizer in Siberia and the Soviet Far East. One of the most promising sites for future development was the Okino-Khubsugulskiy phosphorite basin, which consists of adjacent regions of the U.S.S.R. and the Mongolian People's Republic.

Potassium.—In 1982, plans called for pot-

ash production to increase to 9.5 million tons of K_2O equivalent, but this target was not met. The revised 1985 plan called for potassium ore extraction to increase to 80.8 million tons per year and potassium fertilizer production to increase to 11.5 million tons per year of K_2O equivalent. An earlier plan called for potash ore extraction to increase to 92 million tons per year in 1985. Original plan targets for 1976-80 called for ore output to increase to 85 to 90 million tons per year by 1980. The average annual rate of depletion of explored potash reserves was 12.85%. In 1981, potassium fertilizer exports decreased more than 20%, with exports to the West decreasing almost 50%. Exports to CMEA countries decreased by about 10%.

Potash extraction and processing in 1982 occurred at enterprises of the Uralkaliy Association centered in Perm Oblast', the Byeloruskaliy Association centered in Minsk Oblast', and at the Stebnikov potash plant in L'vov Oblast', Ukraine. There were 11 underground mining enterprises and 10 concentration plants at Uralkaliy, Byeloruskaliy, and Stebnikov. Ore extraction ranged from 3 to 10 million tons per year for individual mines. Mining was conducted to a depth of 1,000 meters.

Growth in output was to occur through commissioning the Novosolikamsk and Berezniki No. 4 complexes of the Uralkaliy Association, each with two stages and respective capacities of 18.1 and 16.1 million tons of ore, and by increasing capacity at the Soligorsk No. 4 complex of the Byeloruskaliy Association. During 1981-85, the quality of the national average product content was to be raised from 92.58% to 93.98% potassium chloride, and the output of granulated potassium chloride was to increase from 1.5 to 3.1 million tons per year. The output of coarse product was to be increased at Soligorsk No. 4 and Berezniki No. 4. Plans were to add dissolution and recrystallization circuits for coarse production.

Although production of large-grain, dust-free potassium chloride had been organized, the quality and assortment of potassium fertilizer was still not satisfying agricultural and export requirements. The principal product was grade-three, small-grain potassium chloride, which accounted for 76% of the volume of potassium fertilizers. The percentage of output of potassium chloride in large-grain and granulated forms was low at 15.5%. Plans were to produce a much greater proportion of granulated material, and the Byeloruskaliy Association planned to convert all its facilities to granulated production.

In 1982, the Stebnik potash plant did not fulfill its yearly production plan. Through October, the Byeloruskaliy and Uralkaliy Associations were far behind schedule in fertilizer deliveries.[51] In the past 6 years, the Uralkaliy Association had fallen short in deliveries by an accumulated 8 million tons of K_2O, which was about equal to 1 year's national output.[52] One of the major problems was declared to be lack of railroad rolling stock, causing production backups and work stoppages owing to lack of storage space.

In 1982, at the Novosolikamsk complex, work was delayed on the 900,000-ton-per-year potassium fertilizer facility scheduled for commissioning in 1983. In 1982, a new unit for the sylvinite crushing plant was commissioned at Soligorsk No. 1. The second stage at Soligorsk No. 4 was not yet working to one-half capacity. The first stage of the Soligorsk No. 4 complex, which was put into operation at the beginning of 1979, was still not working to capacity by the end of 1982. Complaints were raised that the second stage was put into operation without adequate preparation, that there were many problems owing to the design of the operation, and that there was a higher than usual accident rate. Further complaints were raised about the proficiency of the labor force.[53]

In the Azerbaidzhan S.S.R., the Kirovabad aluminum plant had commissioned a 60,000-ton-per-year potash facility to produce potassium sulfate from alunites. A detailed study was reported begun of the large Nepskoye potash deposit in Irkutsk Oblast', approximately 300 kilometers north of the Ust'-Kut railroad station on the Baikal-Amur Railway. Owing to improved port facilities at Ventspils, Latvia, the Soviet Union improved its potassium fertilizer shipment capability.

Salt.—The Soviet Union in 1982 was one of the world's leading countries for salt production, reserves, and exports. A salt mine at Khodhaikan in Uzbekistan was under development along with a crushing and storing plant with a capacity of 1 million tons per year. At the Mozyr deposit in Byelorussia, construction was underway of the Ekstra salt plant with a capacity of 360,000 tons per year.

Sulfur.—Native sulfur production, excluding sulfur as a byproduct of natural gas,

pyrites, and other sources, was reported by the Soviets as over 2.8 million tons. Sulfur ore extraction in 1985 was planned to increase to 14.3 million tons. The average annual rate of depletion for explored sulfur reserves was 11.25%. Sulfur ore at enterprises of the Ministry for Mineral Fertilizer was extracted primarily from open pits. The sulfur content of the ore averaged 20% to 24% and was concentrated by flotation. The Soviets reported that approximately 800,000 tons per year of ore was obtained using the Frasch process. Open pit mining was used to a depth of 100 meters, and the Frasch process at greater depths.

At the Yavorov complex in the Ukraine and the Gaurdak complex in Turkmenistan, approximately 30% of the output of native sulfur was produced by the Frasch process.

During 1981-85, open pit extraction was planned to increase. The Yavorov Association intended to achieve full production capacity of 7.25 million tons per year of ore at the Tsentral'naya open pit, to develop the Yuzhnyy open pit, and to increase the capacity of the concentration complex. Using the Frasch process, it planned to begin development of the Zagaypol'skiy Mine and to prepare for development of the Grimnovskiy Mine. When the Yavorov Association reached full capacity, it would produce 1 million tons per year of sulfur. At the Rozdol and Yavorov Associations in the Ukraine, combined sulfur production was reported as 2.1 million tons in 1980 and was planned to increase to 3.2 million tons in 1985.

In 1982, the Yavorov Association failed to fulfill its production plan by 160,000 tons, causing shortages of raw material for processing at the Rozdol Association. The Gaurdak Association also reported low output owing to difficulties in applying the Frasch process. If conditions did not improve, reportedly, there would be a shortage of sulfuric acid for producing superphosphate. Production of sulfur from natural gas was planned to increase 25% during 1981-85, and the large Astrakhan sour gas deposit was to be developed with facilities for sulfur production.

MINERAL FUELS

Crude oil production reportedly rose 0.6%, falling slightly below the target, but natural gas production increased 8%, exceeding the target. Production of coal rose after 3 years of declining production. While the vast majority of recently discovered energy reserves are east of the Urals, three-fourths of the energy consumption was in the European part of the country. The distance and the severe climatic conditions at the new deposits greatly increased energy costs. Nevertheless, the Soviet Union had sufficient combined energy resources to last for centuries.

Natural gas was planned to be of increasing importance as a substitute for oil and as a hard-currency-earning export. Nuclear power was planned to be of increasing importance for domestic electrical energy and by 1985 was to provide 14.2% of electrical energy compared with 5.6% in 1980.

Gas and oil pipelines totaled over 200,000 kilometers, with another 200,000 kilometers of distribution grids and gasfield and other pipelines. During 1981-85, about 60,000 kilometers of pipeline was to be constructed, including approximately 50,000 kilometers for gas transport and 10,000 kilometers for oil transport.

During the winter of 1981-82, there was a shortage of fuel, which caused some enterprises to operate below capacity.[54] Recommendations were made to improve the situation for the winter of 1982-83. In September 1982, the complaint was raised that nonferrous metallurgical enterprises in Kazakhstan were not being supplied with sufficient coal in preparation for the winter.[55]

Table 7.—U.S.S.R.: Estimated primary energy balance in 1982

(Million tons of standard coal equivalent)

	Production	Imports	Exports	Apparent consumption
Coal (lignite, anthracite, bituminous, coke)	480	23	23	480
Crude oil and petroleum products	900	9	263	646
Natural and associated gas	593	5	70	528
Peat	14	--	--	14
Oil shale	13	--	--	13
Hydropower	21	--	2	19
Nuclear power	12	--	--	12
Fuelwood	24	--	--	24
Total	2,057	37	358	1,736

Coal.—Raw coal production in 1982 fell short of the plan, but still registered the first annual increase since 1978. Only a slight growth in output was scheduled for 1983, to 723 million tons. Practically all Soviet coal required beneficiation, but in 1981, only 48% actually was beneficiated. In an attempt to make prices reflect production costs, in 1982, the domestic wholesale price of coal was increased an average of 42%, with prices differentiated by basin and type of coal. The coal industry was faced with decreasing productivity despite increased mechanization. Between 1975 and 1980, average speed of drilling and blasting horizontal development workings decreased 17% and the average speed of mining with tunneling machinery decreased 13%.[56] Soviet coal production was aided by the development of large open pits. Open pits with the largest design capacity included the Bogatyr' (70 million tons per year), Tsentral'naya (20 million tons per year), Irsha-Borodinskiy (20 million tons per year), Nazarovskiy (13 million tons per year), and Azeyskiy (10 million tons per year). In 1981, the average capacity of an open pit was 4.1 million tons per year. Increased coal output in 1982 was attributable, in part, to an increase in production from the Bogatyr' open pit in the Ekibastuz Basin in Kazakhstan. During 1981-85, the output of surface-mined coal was planned to increase to 41% of total output, in comparison with 39% in 1981.

Problems in increasing coal production were occurring in the Donets Basin in the Ukraine. Most mines in the Donets Basin were being developed with considerable delays, and development time often exceeded twice that planned.[57] The largest planned increases in coal production were to be in Kazakhstan, Siberia, and the Soviet Far East at the Ekibastuz, Kansk-Achinsk, Kuznetsk, and Yakutsk Basins where the vast majority of reserves are located. At the Ekibastuz Basin in Kazakhstan, development was underway of the 30-million-ton-per-year Vostochnyy open pit. The Bogatyr open pit, with a planned capacity of up to 70 million tons per year, was already in operation at the Ekibastuz Basin.

At the Kansk-Achinsk Basin in East Siberia, development had begun of the Berezovskiy open pit, with a design capacity of 55 million tons per year. The first stage was planned to go into operation in 1983. Production at the Kansk-Achinsk Basin where two open pits, the Irsha-Borodinskiy and the Nazarovskiy, were in operation was approximately 37 million tons in 1982. With the development of open pits, output at Kansk-Achinsk was planned to increase to 49 million tons per year in 1985. The construction of the large Berezovskiy thermal powerplant was underway to make use of the lignite from Kansk-Achinsk.

In the Kuznetsk Basin in Siberia, the second largest coal producing region after the Donets Basin, output during 1981-85 was planned to increase 10% to 158 million tons. Development was beginning at the Yerunakovskoye and Taldinskoye deposits, and first output was reported from the Severo-Taldinskiy and Karakanskiy open pits. In 1982, there were 68 underground mines in operation in the Kuznetsk Basin. Limited capital investment was faulted for inadequate development in the Kuznetsk Basin during 1981-85. There had been inadequate investment in mine development, in production of coal mining machinery, and in establishment of repair facilities.[58]

The Neryungri coking coal complex in southern Yakutia was being developed jointly by the U.S.S.R. and Japan, and a portion of the beneficiated coal was to be sent to Japan. During 1981-85, construction was to be completed of an open pit, with a capacity of 13 million tons per year, and a concentration plant, with a planned capacity of 9 million tons per year. The open pit was being developed in four stages. The first stage, which was in operation, exceeded its capacity of 2.5 million tons per year. The second stage was also to have a capacity of 2.5 million tons per year, and the third and fourth stages, a capacity of 4 million tons per year each. The third stage was scheduled to go into operation in 1983. Development of the Neryungri complex was behind schedule and was being hampered by problems with inexperienced labor and in maintenance and the supply of spare parts.[59]

Occidental Petroleum Corp. and Bechtel Corp. executives discussed with Soviet officials construction of a trans-Siberian coal slurry pipeline using advanced U.S.-developed methanol slurry technology. This project would make vast Siberian coal reserves available to consumers in the western part of the country; the rail system was not equipped for increased Siberian coal shipments. Whether the Soviets actually planned to go ahead with this project was in doubt as was obtaining the permission of the U.S. Government to allow exports of technology and equipment for the project.

Other proposed solutions for utilizing Siberian lignite included construction of large thermal powerplants near the deposits with long-distance electricity networks and transforming the coal into liquid fuels. Which solution or combination of solutions the Soviets would choose was in doubt and would depend on mastering the necessary technology and the availability of financing and equipment.

The Soviets announced a decision to construct an approximately 200-kilometer slurry pipeline from the Kuznetsk Basin to Novosibirsk. Two coal slurry pipelines under 15 kilometers were in operation in the Kuznetsk Basin. In 1982, production was reported from the first installation for producing synthetic gasoline from coal located near the Bel'kovskay Mine in Tula Oblast'. It could process 7 tons of coal per day.

Natural Gas.—In 1982, natural gas production increased at higher than the planned rate. Production in 1983 was targeted at 18.7 trillion cubic feet. Natural gas was used as a fuel domestically to produce 93% of the steel and pig iron, 95% of the fertilizers, 59% of the cement, 22% of the electricity, and 37% of the thermal energy. Gas exports were to play an increasing role for earning hard currency and supplying energy to East Europe.

According to Soviet data, gas reserves in categories $A+B+C_1$ as of January 1978 were 1,030 trillion cubic feet. Gas reserves are highly concentrated; two-thirds of the gas is in 25 fields and almost one-half is in 10 of these.[60]

In 1983, gas production in West Siberia was planned to increase to 9.5 trillion cubic feet, comprising 51% of national production, in comparison with 46% in 1982. In 1985, gas production in West Siberia was to increase to 12.6 trillion cubic feet, comprising 56% of national output. The large planned increase in natural gas production in West Siberia was to be achieved primarily through a fivefold increase over that of 1980 at the Urengoy Field. South of Urengoy is the Medvezhye deposit, previously the country's largest producer. To the north is the Yamburg deposit, which was planned to yield 3.5 trillion cubic feet per year. Drilling of the first regular production well at Yamburg commenced, and production was scheduled to begin in 1986.

Preparations were underway for the exploitation of the Astrakhan sour gas field, a major deposit located approximately 60 miles north of the city of Astrakhan; the field is one of the largest in the European part of the U.S.S.R. A group headed by the French companies Technip and Creusot Loire S.A. was awarded a contract to supply technical assistance and equipment to develop the Astrakhan Field. In addition, pipe and equipment contracts to develop Astrakhan were awarded to the West German company Mannesmann Anlagebau. The Astrakhan complex was to consist of three plants and to have a final capacity of 636 billion cubic feet. Delivery of equipment for the first plant was scheduled to start in 1984, and the startup was scheduled for 1986. The complex would include a facility for sulfur production.

During 1981-85, six trans-Siberian pipelines from the Urengoi Field were to be constructed, totaling approximately 20,000 kilometers. One of the six, the Urengoi-Uzhgorod pipeline, was intended for gas export to West Europe. By the end of 1982, two of the five domestic pipelines were in operation, and construction was about one-half completed on the export pipeline. Workers from CMEA countries were assisting in the construction of the export pipeline, and Western countries were supplying considerable amounts of pipe and equipment.

In November, the United States removed the trade sanctions against the Soviet Union imposed because of the proclamation of martial law in Poland. The sanctions affected U.S. and foreign companies supplying U.S. equipment or technology directly or indirectly for use on the trans-Siberian export pipeline.

The Soviets announced plans to construct a booster station to increase capacity for the Orenburg gas pipeline, which runs to the Czechoslovak border. The station could enable the Soviets to increase gas shipments to CMEA countries.

Gas treatment capacity for the recovery of natural gas liquids and sulfur was being expanded. The third stage of the Mubarek gas processing plant, put into operation in 1981, achieved its design capacity in early 1982. In 1983, the Lokosovskiy gas processing plant in Tyumen' Oblast' was to be commissioned, with a capacity for processing 35 billion cubic feet of gas per year.

In March 1982, the Soviets reported another commercial gas discovery in the Black Sea. The first gas from this area was to be produced in 1982 from the Golitsyn Field, which was discovered in 1975 about 45 miles west of the Crimea's Tarkhankut Peninsu-

la. In 1980, 2.9% of Soviet gas production came from offshore fields, and 99% of that was from Caspian Sea fields.

Although the Soviets intended to ship up to 1.4 trillion cubic feet of gas to West Europe through the Uzhgorod export pipeline starting in 1984, by the end of 1982, they had long-term contracts for only about one-half that amount. Contracts were with the Federal Republic of Germany for 370 billion cubic feet, France for 280 billion cubic feet, Austria for 53 billion cubic feet, and Switzerland for 13 billion cubic feet. Swiss shipments were to be made indirectly from the Federal Republic of Germany. Italy had still not approved the contract for the sale of 280 billion cubic feet.

Petroleum.—In 1982, Soviet petroleum production continued to increase, although not as rapidly as planned. The reported average annual rate of depletion for explored oil reserves was 7.6%. West Siberia produced 2.6 billion barrels, comprising 58% of total output. Tyumen' Oblast' in West Siberia produced over 97% of the output of West Siberia, with some output also from Tomsk Oblast'. In 1983, oil production in West Siberia was planned to increase to 2.7 billion barrels. However, new production in West Siberia was planned to come from deposits in more northern regions that would be more difficult to develop. In 1982, offshore production in the Caspian Sea, virtually the U.S.S.R.'s only offshore crude oil production area, was at its lowest level since the early 1960's.

Table 8.—U.S.S.R.: Crude petroleum production in 1982, by region

(Billion barrels)

Region	Output
West Siberia	2.59
Ural-Volga	1.23
Caucasus	.22
Kazakhstan and Soviet Central Asia	.21
Komi A.S.S.R.	.15
Other regions including the Ukraine, Byelorussia, Sakhalin and Kalingrad Oblast's, Yakutia, and others	.10
Total	4.50

Source: Ekonomicheskaya gazeta (Economic Gazette), Moscow, No. 8, February 1983, p. 1.

By 1985, output from West Siberia was to increase about 10% in comparison with that of 1982 to 2.8 to 2.9 billion barrels, comprising over 60% of planned output. West Siberia was being termed a "mature" region, indicating that rapid production increases were no longer expected. Still, West Siberia had not been thoroughly explored, and the ratio of meters of exploratory drilling per square kilometer was lower than in the older oil producing regions of the U.S.S.R.

According to Soviet reports, in 1981, production peaked at West Siberia's giant Samotlor Field, producing approximately 3.1 million barrels per day. In addition, production at West Siberia's second largest field, Fedorovo, producing approximately 730,000 barrels per day, and its third largest field, Mamontovo, producing approximately 550,000 barrels per day, was also possibly nearing its peak.

During 1981-85, drilling by the Soviet oil industry was to approximately double the amount drilled during 1976-80. Most of the new drilling would be in West Siberia with increases also in western Kazakhstan, the Komi A.S.S.R., and the European North where it was planned to increase production. In 1983, exploratory drilling totaling 26.7 million meters was planned, which was 3.4 million meters more than was drilled in 1982, and 11,000 new wells were to be put into operation.

During 1981-85, 27 new fields were scheduled to be placed in operation in Tyumen' Oblast', West Siberia. Oil drilling in Tyumen' Oblast' in 1982 was about 13 million meters, a 25% increase compared with that of 1981. Regarding oil recovery, water flooding recovery reportedly had exhausted its potential, and the introduction of tertiary recovery methods was lagging.

Production declines were reported west of Siberia in the Tatar A.S.S.R., the Bashkir A.S.S.R., Kuybyshev Oblast', Perm Oblast', and Orenburg Oblast'. The most severe declines were in the older production areas of the Ukraine, Turkemenistan, Azerbaidzhan, Byelorussia, and the North Caucasus. Failure to discover significant oil reserves in East Siberia during the 1970's was a major disappointment for the Government. Declining oil production was particularly severe in Byelorussia, which was considered to be a good potential producing area in the mid-1970's. In 1982, Byelorussia was producing only 25% of its 1975 output, when production had peaked at over 147,000 barrels per day.

During the past decade, the cost of oil production had increased greatly, and the ratio of output to meters drilled significantly declined.[61] By 1982, increased production in West Siberia was expected to be in areas farther from existing production bases,

which would add to costs. During 1981-85, the national operational well inventory was to increase 50% to about 129,000 wells. Also, construction of about 10,000 kilometers of crude oil pipeline was planned, raising the crude network to about 80,000 kilometers. This would enable 95% of all crude oil to be transported by pipeline.

As part of an effort to make prices reflect costs, in 1982, the Government increased 130% the average wholesale price of crude oil paid to extraction enterprises; the amount paid extraction enterprises was to be differentiated by fields. All refineries were to be charged the same amount for crude oil, depending on its quality. The wholesale price of petroleum products was increased, and there was to be one set of prices for refinery products. The wholesale price of crude oil for refineries was set at 31.5 rubles per ton for oil with 0.5% to 0.6% sulfur, and at 30 rubles per ton for oil with a higher sulfur content.

Contrary to predictions that the Soviet Union was going to decrease oil sales to market economy countries, it instead increased sales markedly. Part of this increase was accounted for by reexported Libyan oil obtained in countertrade. The Soviet Union cut prices to compete for its market share. Increased sales were coupled with decreased deliveries to East Europe.

The Soviet Union began its first offshore Arctic drilling with a test near Arkhangelsk Oblast' in the Pechora Sea, and more offshore Arctic exploration was scheduled. At least two drilling platforms were installed in the Baltic Sea off Kaliningrad Oblast', and additional platforms were planned for the area. The U.S.S.R., the German Democratic Republic, and Polish consortium Petrobaltic reportedly drilled a well that found an undisclosed volume of oil and gas in Polish waters approximately 35 miles north of the Polish city of Gydnia and 60 miles west of the closest Soviet field, off Kaliningrad Oblast'.

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[1]This publication is based on a review of sources published in the U.S.S.R.

[2]Foreign mineral specialist, Division of Foreign Data.

[3]Zhurnalist (Journalist), Moscow. No. 5, May 1982, pp. 12-14.

[4]Razvedka i okhrana nedr (Exploration and Conservation of Mineral Resources), Moscow. No. 6, June 1982, pp. 36-40.

[5]The ruble is a nonconvertible currency, and the Soviet official exchange rate cannot be used as even a rough measure of relative purchasing power. The official exchange rate for December 1982 averaged 1 ruble = US$1.37.

[6]Ekonomika i organizatsiya promyshlennogo proizvodstva (Economics and Organization of Industrial Production), Novosibirsk. No. 9, September 1982, pp. 3-33.

[7]Council for Mutual Economic Assistance (CMEA) was founded in January 1949. The founding members were Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and the U.S.S.R. Albania joined in February 1949 but ceased to take part in meetings in 1961. The German Democratic Republic was admitted in 1950, Mongolia in 1962, Cuba in 1972, and Vietnam in 1978. Yugoslavia obtained permanent observer status in 1965.

[8]Gornyy zhurnal (Mining Journal), Moscow. No. 12, December 1982, p. 29.

[9]Planovoye khozyaystvo (Planned Economy), Moscow. No. 8, August 1981, pp. 111-115.

[10]Ekonomika i organizatsiya promyshlennogo proizvodtsva (Economics and Organization of Industrial Production), Novosibirsk. No. 3, March 1982, pp. 66-84.

[11]Pravda (Moscow). Feb. 24, 1982, p. 2.

[12]———. Aug. 24, 1982, p. 2.

[13]Sotsialisticheskaya industriya (Socialist Industry), Moscow. July 18, 1982, p. 2.

[14]Gornyy zhurnal (Mining Journal), Moscow. No. 4, April 1983, p. 4.

[15]Material'no-teknicheskoye snabzheniye (Material-Technical Supply), Moscow. No. 9, September 1982, p. 58.

[16]Sotsialisticheskaya industriya (Socialist Industry), Moscow. Jan. 21, 1983, p. 2.

[17]Journal of Commerce (New York). Dec. 2, 1982, p. 3A.

[18]Sotsialisticheskaya industriya (Socialist Industry), Moscow. Jan. 30, 1983, p. 1.

[19]Tsvetnaya metallurgiya (Nonferrous Metallurgy), Moscow. No. 9, September 1982, p. 16.

[20]Izvestiya Akademii Nauk S.S.S.R.: Metally (Reports of the Soviet Academy of Sciences, Metals), Moscow. No. 5, September-October 1982, pp. 7-12.

[21]Tsvetnye metally (Nonferrous Metals), Moscow. No. 4, April 1983, p. 3.

[22]Kazakhstanskaya Pravda (Alma-Ata). Apr. 13, 1983, p. 2.

[23]———. June 4, 1983, p. 2.

[24]Work cited in footnote 23.

[25]Work cited in footnote 22.

[26]Izvestiya (Moscow). July 12, 1983, p. 2.

[27]Tsvetnye metally (Nonferrous Metals), Moscow. No. 1, January 1983, p. 83.

[28]Gornyy zhurnal (Mining Journal), Moscow. No. 10, October 1982, pp. 19-21.

[29]Work cited in footnote 15.

[30]$A+B+C_1$ are economic reserves called explored reserves. C_2 are uneconomic reserves of lower reliability that are taken into account, but do not constitute a justification for project planning.

[31]Gornyy zhurnal (Mining Journal), Moscow. No. 9, September 1982, p. 41.

[32]Material'no-teknicheskoye snabzheniye (Material-Technical Supply), Moscow. No. 1, January 1982, pp. 19-24.

[33]Work cited in footnote 13.

[34]Tsvetnye metally (Nonferrous Metals), Moscow. June 1982, p. 18.

[35]Work cited in footnote 26.

[36]Work cited in footnote 20.

[37]Kazakhstanskaya Pravda (Alma-Ata). Dec. 10, 1982, p. 1.

[38]Work cited in footnote 26.

[39]Work cited in footnote 27.

[40]Pravda (Moscow). Sept. 8, 1982, p. 1.

[41]Work cited in footnote 15.

[42]Sotsialisticheskaya industriya (Socialist Industry), Moscow. Nov. 20, 1982, p. 2.

[43]Foreign Trade (Moscow). No. 6, June 1982, p. 8.

[44]Izvestiya (Moscow). July 13, 1983, p. 2.

[45]Pravda (Moscow). Oct. 19, 1982, p. 2.

[46]Work cited in footnote 19.

[47]Page 104 of work cited in footnote 21.

[48]Kazakhstanskaya Pravda (Alma-Ata). Nov. 14, 1982, p. 1.

[49]Foreign Trade (Moscow). No. 9, September 1982, pp. 12-13.

[50]Narodnoye khozyaystvo Kazakhstana (National Economy of Kazakhstan), Alma-Ata. No. 9, September 1981, pp. 51-53.

[51]Zhurnal vsesoyuznogo khimicheskogo obshchestva imeni D.I. Mendeleyeva (Journal of the All-Union Chemical Society, named in honor of D. I. Mendeleyev), Moscow. V. 27, No. 3, May-June 1982, pp. 10-16.

[52]Work cited in footnote 42.

[53]Sotsialisticheskaya industriya (Socialist Industry), Moscow. Oct. 14, 1982, p. 2.

[54]Pravda (Moscow). Dec. 14, 1982, p. 2.

[55]Sotsialisticheskaya industriya (Socialist Industry), Moscow. Sept. 16, 1982, p. 2.
[56]Kazakhstanskaya Pravda (Alma-Ata). Sept. 15, 1982, p. 1.
[57]Shakhtnoye stroitel'stvo (Mine Development), Moscow. No. 7, July 1983, p. 9.
[58]Sotsialisticheskaya industriya (Socialist Industry), Moscow. July 17, 1982, p. 2.
[59]Pravda (Moscow). Oct. 10, 1982, p. 2.
[60]Gazovaya promyshlennost' (Gas Industry Journal), Moscow. No. 9, September 1982, pp. 12-15.
[61]Ekonomicheskaya gazeta (Economic Gazette), Moscow. No. 49, December 1982, p. 17.
Neftyanoye khozyastvo (Oil Economics), Moscow. December 1982, p. 10.

The Mineral Industry of the United Arab Emirates

By John R. Lewis[1]

The United Arab Emirates reported a gross domestic product (GDP) in 1982 of $30 billion[2] and a per capita income of over $24,000, one of the highest in the world. The federation's economy was dominated by its exports of crude petroleum and liquefied natural gas (LNG). Abu Dhabi, with a very large share of known oil and gas reserves, together with Dubai, were the major centers of industrialization. Sharjah and Umm al-Qaiwain shared income from several small oilfields and a promising gas condensate field was completed in Sharjah. Other Emirates appeared to have little prospect of natural mineral resources.

The country's growth had been paced by its substantial income from oil, which increased dramatically when prices of crude oil in world markets rose sharply during the late 1970's. Over 70% of the GDP came from the sale of petroleum and its coproducts. Annual rate of growth in 1982 was about 8%.

PRODUCTION

Production of minerals and mineral-based products in the United Arab Emirates was confined to petroleum and its products, dry and liquefied natural gas, cement, aluminum, steel, explosives, and pharmaceuticals. The $20 billion Ruwais complex, center of Abu Dhabi's industrialization, included the 120,000-barrel-per-day refinery of the Abu Dhabi National Oil Co. (ADNOC), which made all the Emirates' requirements for naphtha, high-quality motor and aviation gasolines, jet and diesel fuels, and had some left over for export. In addition to the products listed, the Ruwais complex contained a nitrogen fertilizer plant that produced about 1,000 tons of ammonia and 1,500 tons of urea per day. Construction plans for the near future included a 27,000-barrel-per-day hydrocracker and a 160,000-ton-per-year petroleum coke plant that would meet the needs of Dubai and Bahrain aluminum smelters for coke and hard pitch blocks. Almost every Emirate had a cement plant either operating or under construction. The amount of cement to be produced when all plants were operating was expected to exceed demand.

Table 1.—United Arab Emirates:[1] Production of mineral commodities[2]

Commodity[3]	1978	1979	1980	1981[p]	1982[e]
ABU DHABI					
Cement, hydraulic[e] thousand metric tons	200	200	500	700	780
Gas, natural:					
Gross production million cubic feet	478,617	483,809	508,445	472,508	410,000
Marketed production do	[r]93,400	[r]40,100	115,500	320,126	300,000
Natural gas liquids thousand 42-gallon barrels	4,983	15,000	32,200	[e]35,000	38,000
Petroleum and refinery products:					
Crude do	527,827	533,995	492,154	413,910	[4]322,295
Refinery products:					
Gasoline do	1,132	[e]1,500	1,500	[e]6,000	13,000
Kerosine do	328	[e]400	400	[e]1,000	6,000
Distillate fuel oil do	1,314	[e]1,600	1,600	[e]6,500	10,000
Residual fuel oil do	1,095	[e]1,400	1,400	[e]5,600	7,000
Naphtha do	73	[e]100	100	[e]1,000	5,000
Refinery fuel and losses do	323	[e]500	500	[e]500	2,000
Total do	4,265	[e]5,500	5,500	[e]20,600	43,000
Sulfur: Byproduct from petroleum refining metric tons	--	--	--	[e]5,000	10,000
AJMAN					
Marble[e] square meters	26,000	26,000	NA	NA	NA
DUBAI					
Aluminum, primary ingot metric tons	--	--	25,000	[e]106,000	100,000
Cement, hydraulic thousand metric tons	370	400	500	[e]500	[4]350
Gas, natural:[e]					
Gross production million cubic feet	147,000	144,000	142,000	146,000	140,000
Marketed production do	30,600	[r]23,400	[r]23,800	38,000	70,000
Natural gas liquids:					
Propane thousand 42-gallon barrels	--	--	1,500	[e]2,500	5,000
Butane do	--	--	[e]1,000	[e]1,100	3,000
Natural gasoline do	--	--	1,000	[e]1,700	4,000
Petroleum, crude do	132,240	129,316	127,818	130,889	[4]130,305
RAS AL-KHAIMAH					
Cement, hydraulic thousand metric tons	450	450	500	[e]800	[4]750
SHARJAH					
Cement, hydraulic[e] do	220	220	220	220	[4]188
Gas, natural:					
Gross production[e] million cubic feet	15,000	8,700	6,600	20,000	30,000
Condensate thousand 42-gallon barrels	--	--	--	--	4,500
Petroleum, crude do	8,067	4,697	3,586	3,540	[4]2,555

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]In addition to the Emirates listed, Fujarah and Umm al-Qaiwain record no mineral production but presumably produce small quantities of crude construction materials.

[2]Table includes data available through Aug. 25, 1983.

[3]In addition to the commodities listed, crude construction materials such as common clays, stone, and sand and gravel presumably are produced, but output is not recorded quantitatively and general information is inadequate to make reliable estimates of output levels.

[4]Reported figure.

TRADE

Trade in minerals and mineral products was dominated by the exports of about $22 billion in petroleum alone. Major markets included the European Economic Community, Japan, and the United States. This same group of trading partners sent $9.1 billion in machinery, consumer goods, and food to the United Arab Emirates. It was with the trade surplus thus generated that the Emirates were funding their tremendous development programs and other projects.

Table 2.—Abu Dhabi: Exports of crude petroleum, by destination

(Thousand 42-gallon barrels)

Destination	1979	1980	1981
Australia	9,198	5,804	5,658
France	r55,663	56,758	43,362
Germany, Federal Republic of	28,324	27,083	16,352
Italy	7,592	14,527	10,220
Japan	163,556	174,616	150,380
Netherlands	38,398	21,900	26,098
United Kingdom	8,066	16,608	7,410
United States	64,897	48,983	32,339
Yemen, Democratic Republic of	2,008	13,578	7,994
Other	r147,022	108,549	90,993
Total	524,724	488,406	390,806

rRevised.

Table 3.—United Arab Emirates: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	Destinations	
		United States	Other (principal)
METALS			
Aluminum:			
Ore and concentrate	83	--	All to Saudi Arabia.
Metal including alloys, semimanufactures	961	--	Pakistan 413; Saudi Arabia 244; Kuwait 210.
Copper: Metal including alloys, semimanufactures	210	--	Iran 109; India 41; Qatar 22.
Iron and steel:			
Iron ore and concentrate, excluding roasted pyrite	16	--	All to Iran.
Metal:			
Scrap	3,836	--	Qatar 2,270; India 1,500; United Kingdom 44.
Pig iron, cast iron, related materials	118	--	All to Iraq.
Ferroalloys, unspecified	4	--	All to Iran.
Semimanufactures:			
Bars, rods, angles, shapes, sections	2,715	--	Saudi Arabia 684; Qatar 536; Yemen Arab Republic 432.
Universals, plates, sheets	3,404	--	Iran 1,196; Bahrain 612; Iraq 427.
Hoop and strip	1	--	All to Kuwait.
Rails and accessories	21	--	Saudi Arabia 20; Kuwait 1.
Wire	227	--	Iran 135; Saudi Arabia 52; Qatar 28.
Tubes, pipes, fittings	5,541	504	Saudi Arabia 1,497; Iraq 807; Bahrain 700.
Lead: Metal including alloys, all forms value, thousands	$1	--	All to Qatar.
Silver: Ore and concentrate do.	$81	$81	
Titanium: Oxides do.	$13	--	All to Qatar.
Zinc: Metal including alloys, semimanufactures	30	--	Mainly to Qatar.
Other: Base metals including alloys, scrap	195	--	Republic of Korea 109; Pakistan 84; Iran 2.
NONMETALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones	1	--	Mainly to Yemen Arab Republic.
Cement	4,574	--	People's Democratic Republic of Yemen 1,132; Bahrain 881; Somalia 477.
Chalk	36	--	All to Iran.
Clays and clay products:			
Crude, unspecified	25	--	All to Pakistan.
Products:			
Nonrefractory	2,313	--	Qatar 741; Iraq 703; Yemen Arab Republic 278.
Refractory including nonclay brick	66	--	Qatar 54; Bahrain 12.
Diamond: Gem, not set or strung value, thousands	$9,673	--	Belgium-Luxembourg $7,501; United Kingdom $1,934; Singapore $150.

See footnotes at end of table.

Table 3.—United Arab Emirates: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	Destinations	
		United States	Other (principal)
NONMETALS —Continued			
Fertilizer materials:			
Crude, n.e.s	1,264	--	People's Democratic Republic of Yemen 686; Iran 286; Somalia 200.
Manufactured:			
Ammonia	22	--	Qatar 17; Saudi Arabia 5.
Nitrogenous	2	--	All to Lebanon.
Unspecified and mixed	244	--	Saudi Arabia 215; Qatar 29.
Gypsum and plaster	266	--	Qatar 263.
Halogens: Chlorine	458	--	Qatar 173; Saudi Arabia 153; Jordan 105.
Lime	493	--	Pakistan 194; Qatar 194; Saudi Arabia 53.
Precious and semiprecious stones other than diamond value, thousands	$435	--	Hong Kong $219; India $202; West Germany $14.
Salt and brine	968	--	Somalia 500; Kuwait 336; Qatar 99.
Sodium and potassium compounds, n.e.s.:			
Sodium carbonate, natural and manufactured	97	--	Pakistan 44; Qatar 35; Saudi Arabia 14.
Sodium hydroxide	1,267	--	Singapore 516; Saudi Arabia 372; Iran 208.
Stone, sand and gravel:			
Dimension stone, worked	430	--	Qatar 236; Saudi Arabia 119; Bahrain 53.
Dolomite, chiefly refractory-grade	125	--	All to Pakistan.
Gravel and crushed rock	26	--	Qatar 19; France 7.
Sand other than metal-bearing	1,248	--	Qatar 797; Saudi Arabia 359; Kuwait 77.
Sulfur:			
Elemental, crude including native and by-product value, thousands	$1	--	All to Pakistan.
Sulfuric acid	83	--	All to Qatar.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	20	--	People's Democratic Republic of Yemen 14; Somalia 4.
MINERAL FUELS AND RELATED MATERIALS			
Hydrogen, helium, rare gases	463	--	Qatar 301; Kuwait 117; Jordan 27.
Petroleum and refinery products:			
Crude thousand 42-gallon barrels	[2]525,236	32,339	Japan 150,380; France 43,362; Netherlands 26,098.
Refinery products:			
Liquefied petroleum gas value, thousands	$36	--	Yemen Arab Republic $21; France $15.
Gasoline 42-gallon barrels	51	--	All to Qatar.
Kerosine and jet fuel do	143,445	--	All to Oman.
Distillate fuel oil do	170,640	--	Oman 170,543.
Lubricants do	34,384	--	Tanzania 24,731; Iran 3,626; Egypt 2,072.
Bitumen and other residues do	600	--	Qatar 588; Iran 12.
Tars and other crude chemicals derived from coal, gas, and petroleum	11	--	All to Saudi Arabia.

[1]Data for 1980 were not available at the time of publication.

[2]Annual Statistical Bulletin 1981 published by the Organization of Petroleum Exporting Countries, Vienna, Austria. Destinations are only for crude petroleum from Abu Dhabi and exclude 130,889,000 barrels exported by Dubai and 3,541,000 barrels exported by Sharjah.

Table 4.—United Arab Emirates: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	Sources	
		United States	Other (principal)
METALS			
Alkaline- and rare-earth metals: Unspecified value, thousands	$8	$6	France $2.
Aluminum:			
Ore and concentrate	9,013	--	All from India.
Oxides and hydroxides	187,028	19	Australia 186,928; West Germany 58.
Metal including alloys:			
Scrap	340	--	Qatar 230; Saudi Arabia 91.
Semimanufactures	10,313	219	United Kingdom 2,197; Belgium-Luxembourg 1,855; Bahrain 1,720.
Copper:			
Ore and concentrate	35	--	Qatar 18; Saudi Arabia 17.
Metal including alloys:			
Scrap	3,401	--	Netherlands 2,017; West Germany 1,000; Qatar 201.
Unwrought	19	--	Mainly from United Kingdom.
Semimanufactures	5,338	416	Japan 1,582; United Kingdom 1,479; Australia 646.
Iron and steel:			
Iron ore and concentrate, excluding roasted pyrite	98,920	--	All from India.
Metal:			
Scrap	313	3	United Kingdom 188; Saudi Arabia 70.
Pig iron, cast iron, related materials	1,347	--	Netherlands 1,114; China 200.
Ferroalloys, unspecified	923	181	Norway 407; United Kingdom 170; France 61.
Steel, primary forms	616	96	Republic of Korea 491; United Kingdom 22.
Semimanufactures:			
Bars, rods, angles, shapes, sections	389,681	955	Japan 196,107; Qatar 119,400; Republic of Korea 22,206.
Universals, plates, sheets	112,926	992	Japan 60,147; West Germany 14,931; Belgium-Luxembourg 7,277.
Hoop and strip	715	43	Qatar 253; Belgium-Luxembourg 170; West Germany 128.
Rails and accessories	342	9	Japan 300; United Kingdom 18.
Wire	29,148	73	Belgium-Luxembourg 9,391; Republic of Korea 5,642; Japan 3,515.
Tubes, pipes, fittings	334,484	40,367	Japan 148,736; France 33,602; Italy 30,102.
Castings and forgings, rough	22	1	United Kingdom 17; France 2.
Lead:			
Oxides value, thousands	$1	$1	
Metal including alloys:			
Unwrought	43	--	United Kingdom 24; West Germany 10; Denmark 6.
Semimanufactures	108	4	West Germany 67; United Kingdom 37.
Mercury value, thousands	$3	$1	United Kingdom $2.
Metalloids: Unspecified do	$5	--	Belgium-Luxembourg $4; United Kingdom $1.
Nickel: Metal including alloys:			
Unwrought	16	--	Mainly from United Kingdom.
Semimanufactures	9	1	West Germany 4; United Kingdom 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$929	--	Switzerland $833; Pakistan $82; United Kingdom $14.
Silver:			
Ore and concentrate do	$274	--	All from France.
Waste and sweepings do	$48	--	Do.
Metal including alloys, unwrought and partly wrought do	$16,406	--	Pakistan $15,009; India $621; Sri Lanka $551.
Tin:			
Oxides	7	--	West Germany 4; United Kingdom 2; Norway 1.
Metal including alloys:			
Unwrought	73	--	United Kingdom 68; West Germany 5.
Semimanufactures	841	7	Japan 790; France 37.
Titanium: Oxides value, thousands	$995	$67	Spain $285; Finland $217; West Germany $124.
Zinc: Metal including alloys:			
Unwrought	287	--	United Kingdom 132; Netherlands 123; West Germany 25.
Semimanufactures	715	1	Japan 437; United Kingdom 98; Republic of Korea 75.

See footnotes at end of table.

Table 4.—United Arab Emirates: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	Sources	
		United States	Other (principal)
METALS —Continued			
Other:			
Pyrophoric alloys	206	(2)	United Kingdom 200; China 5.
Base metals including alloys, all forms value, thousands	$198	$20	Japan $75; France $49; West Germany $34.
NONMETALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	20,844	110	Netherlands 19,769; France 505; United Kingdom 306.
Grinding and polishing wheels and stones	902	11	Italy 586; Switzerland 74; United Kingdom 67.
Asbestos, crude	10,359	19	Republic of South Africa 6,235; Canada 2,931; Australia 1,071.
Barite and witherite	24,843	--	India 24,137; Netherlands 510.
Cement	857,209	5	Republic of Korea 497,343; U.S.S.R. 37,881; Romania 27,700.
Chalk	2,364	--	Belgium-Luxembourg 2,210; France 102.
Clays and clay products:			
Crude, unspecified	13,500	1,164	India 11,321; Singapore 924.
Products:			
Nonrefractory	73,667	66	West Germany 24,034; Italy 13,039; United Kingdom 11,200.
Refractory including nonclay brick	4,053	118	Lebanon 995; United Kingdom 806; West Germany 754.
Diamond:			
Gem, not set or strung value, thousands	$12,827	$236	India $6,516; Belgium-Luxembourg $5,071.
Industrial do	$8	--	All from Qatar.
Fertilizer materials:			
Crude, n.e.s	21,563	--	Pakistan 19,453; Lebanon 992; Saudi Arabia 376.
Manufactured:			
Ammonia	106	31	Netherlands 21; West Germany 20; India 13.
Nitrogenous	2,638	2	Qatar 470; France 350; West Germany 311.
Phosphatic	908	(2)	Qatar 250; Netherlands 184; Lebanon 164.
Unspecified and mixed	10,965	2	West Germany 5,471; Netherlands 4,426; East Germany 255.
Graphite, natural	12	--	Mainly from Saudi Arabia.
Gypsum and plaster	2,489	17	Belgium-Luxembourg 627; Saudi Arabia 416; United Kingdom 396.
Halogens: Chlorine	3,289	8	India 1,637; Pakistan 1,191; Japan 399.
Lime	1,244	--	Belgium-Luxembourg 1,031; Bahrain 110.
Magnesium compounds: Magnesite value, thousands	$199	$25	Netherlands $135; Norway $21.
Mica: Crude including splittings and waste	430	5	India 404; Netherlands 13.
Pigments, mineral:			
Natural, crude	36	--	All from West Germany.
Iron oxides and hydroxides, processed value, thousands	$123	$5	West Germany $98; United Kingdom $13.
Precious and semiprecious stones other than diamond do	$3,603	$25	France $1,367; Afghanistan $1,117; Kenya $353.
Salt and brine	20,777	336	Netherlands 8,933; China 3,771; India 2,770
Sodium and potassium compounds, n.e.s.:			
Potassium hydroxide including sodic and potassic peroxides	5	3	Sweden 2.
Sodium carbonate, natural and manufactured	2,039	19	Netherlands 864; West Germany 410; France 282.
Sodium hydroxide	1,662	300	West Germany 870; Belgium-Luxembourg 230.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	8,391	--	Italy 8,094; Spain 118.
Worked	16,797	--	Italy 13,930; Lebanon 864.
Dolomite, chiefly refractory-grade	7,353	160	India 4,717; Norway 1,140; Netherlands 275.
Gravel and crushed rock	6,439	87	India 4,248; Italy 979; Netherlands 336.
Limestone other than dimension	35	--	Saudi Arabia 30; Canada 5.
Sand other than metal-bearing	11,837	952	Norway 3,123; Mozambique 3,001; Saudi Arabia 1,494.
Sulfur:			
Elemental:			
Crude including native and byproduct	391	--	Bahrain 354; France 12.
Colloidal, precipitated, sublimed	295	--	All from Bahrain.
Sulfuric acid	1,946	8	Kuwait 1,890; Netherlands 41.

See footnotes at end of table.

Table 4.—United Arab Emirates: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	Sources	
		United States	Other (principal)
NONMETALS —Continued			
Other:			
Crude	4	--	All from United Kingdom.
Oxides and hydroxides of barium, magnesium, strontium	29	26	France 3.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	8,526	31	United Kingdom 3,240; India 2,308; Yugoslavia 890.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	33	29	Bahrain 4.
Coal:			
Briquets of anthracite and bituminous coal	9	--	All from Syria.
Lignite including briquets	64	64	
Coke and semicoke	53	--	United Kingdom 31; West Germany 10; Lebanon 10.
Hydrogen, helium, rare gases	2,187	179	West Germany 646; Netherlands 572; Japan 260.
Petroleum refinery products:			
Liquefied petroleum gas value, thousands	$5,004	$55	Bahrain $3,545; Qatar $1,080; Australia $58.
Gasoline thousand 42-gallon barrels	2,469	--	Bahrain 1,543; People's Democratic Republic of Yemen 802.
Mineral jelly and wax 42-gallon barrels	968	(2)	United Kingdom 441; France 291; West Germany 150.
Kerosine and jet fuel thousand 42-gallon barrels	3,597	(2)	Kuwait 1,381; Bahrain 1,380; Singapore 498.
Distillate fuel oil do	8,350	--	Bahrain 4,843; People's Democratic Republic of Yemen 2,478; Singapore 502.
Lubricants value, thousands	$64,746	$5,227	Australia $18,545; Singapore $12,115; United Kingdom $9,078.
Nonlubricating oils 42-gallon barrels	6,629	3,073	France 917; United Kingdom 742; Italy 728.
Residual fuel oil thousand 42-gallon barrels	3,526	--	Bahrain 3,021; Saudi Arabia 239; Iran 175.
Pitch and pitch-coke value, thousands	$3,548	$1	Australia $3,075; Republic of Korea $317.
Bitumen and other residues thousand 42-gallon barrels	1,264	(2)	Bahrain 1,014; United Kingdom 73; Kuwait 50.
Bituminous mixtures value, thousands	$29,828	$747	Bahrain $13,315; Saudi Arabia $6,873; Netherlands $4,075.
Petroleum coke do	$12,357	$10,533	Australia $1,819.
Tars and other crude chemicals derived from coal, gas, and petroleum	664	30	United Kingdom 377; West Germany 256.

[1]Data for 1980 were not available at the time of publication.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The $1.4 billion smelter of the Dubai Aluminum Co. (DUBAL) at Jebel Ali performed at its full capacity of 135,000 tons of metal per year during 1982. At times, the 360-pot facility was turning out 99.86% pure aluminum at rates as high as 142,000 tons per year. However, the shadow cast by the slump in worldwide metal markets early in 1982 prompted DUBAL's management to develop a 5-year antirecession strategy that was aimed at cutting costs and increasing production. The announced plan included higher unit returns through greater output at lower costs. Part of the savings would come from a reduction of expatriate workers in the work force. Additional investments were planned for new downstream units, including additional capacity for manufacturing aluminum rods, an aluminum powder plant, a number of projects involving secondary aluminum, and expansion of the plant's water desalinization process by using waste heat from the smelter.

Japan was DUBAL's largest customer, but the company hoped to be able to in-

crease to about 25,000 tons per year the amount sold to neighboring Persian Gulf countries. DUBAL was owned 80% by the Dubai Government, 7.5% by the Southwire Corp. of the United States, 7.5% by Nissho-Iwai Corp. of Japan, and 5% by various local interests within the Emirates.

Chromium.—Discovery of chrome ore deposits was reported in a mountainous area of Fujairah, 350 kilometers east of Abu Dhabi. A contractor, Geoconsult Co., made the announcement during May or June.[3]

NONMETALS

Cement.—Apparently reacting to leveling off in demand for cement, the United Arab Emirates cement producers reduced their output slightly. However, additional production capacity was coming onstream, creating a potential oversupply problem for the country. With production slightly over 2 million tons per year and capacity approaching 4 million tons per year, industry leaders were calling for concessions on the part of the Government so that existing plants would be able to compete in foreign markets. Included among the suggested assistance were subsidized prices for power and fuel and relief from certain customs duties. In 1982, there were six operating cement plants in the seven Emirates, two more were in various stages of construction, and a new cement company was announced in the only Emirate that had not as yet had a plant within its borders. Cement company officials and others were expressing concern that production capacity would go to 10 million tons per year, an amount equal to 10 tons per person in the United Arab Emirates; considered by some of the Emirates' cement producers to be a dangerous state of overproduction that had potential for serious price wars.

At the same time, and following the trend of previous years, plans for even more cement plants were announced. A decree was issued in Umm al-Qaiwain establishing the Umm al-Qaiwain Cement Co., a public joint stock company, with rights to manufacture cement for 25 years. Construction of the 500,000-ton-per-year cement plant of the Ajman Cement Co. at Hamidiyyah continued during the year under a $26.5 million contract with Nissho-Iwai of Japan.

Fertilizer Materials.—Construction of the world-scale ammonia and urea facilities as part of the Ruwais industrial complex in Abu Dhabi continued during the year. A revised estimate indicated that the plant would cost $334 million, about 11% more than originally estimated. Feed stocks will be from associated natural gas collected from Abu Dhabi's oil wells plus gas from the country's onshore natural gasfields. Completion was targeted for November, 1983. The construction contractor was the Chiyoda Chemical Engineering and Construction Co. of Japan. Originally planned to produce 1,000 tons per day of ammonia and 1,500 tons per day of urea, a 100% expansion was already being planned for completion in 1985.

MINERAL FUELS

Natural Gas.—Gas was playing an increasing role in the United Arab Emirates economy, particularly in Abu Dhabi which was steadily developing its gas reserves. Another two major gas-gathering schemes have now been completed so that flaring of associated gas has been virtually eliminated, after being in excess of 80% in 1975. From onshore fields, all available associated gas is gathered and piped to Ruwais for fractionating, liquefied petroleum gas (LPG) is exported, and dry gas is taken to Abu Dhabi City. Recent cutbacks in oil production have caused a shortage of gas supplies for this project that was designed to utilize gas associated with oil production of 980,000 barrels per day. Offshore, additional facilities have been installed to augment the supply of associated gas to Das Island's LNG plant, which was operating at 105% of design capacity. Existing storage was being replaced by seven new steel and concrete tanks due to be completed by 1984. Dubai has an associated gas installation at Jebel Ali that commenced operation in 1980, dry gas was provided as fuel for the aluminum smelter, and LPG was exported to Japan under 5-year offtake agreements. LPG exports from the United Arab Emirates, however, were facing severe competition on world markets.

Abu Dhabi also had large reserves of natural gas, the extent of which had not been fully evaluated although exploration was proceeding, particularly in the very extensive but deep Khuff formation that at one location yielded 80 million cubic feet per day of good-quality, low-sulfur gas. Plans were prepared to develop a natural gas reservoir, Thamama C, for use by 1983-84 when it was expected that the availability of associated gas will be insufficient to meet domestic demand.

Petroleum.—Crude oil was produced by three of the Emirates: Abu Dhabi—883,000 barrels per day, Dubai—357,000 barrels per day, and Sharjah—7,000 barrels per day. At

these rates of production, the United Arab Emirates output was off 17% in 1982 from the 1981 level of 1,502,300 barrels per day and down almost 28% from the 1980 production level of 1,701,900 barrels per day. The Emirates annual production, likewise, was off in 1982. Total crude output was 455,155,000 barrels; in 1981 it was 548,300,000 barrels; and in 1977, the all-time high annual production amounted to 729,500,000 barrels. Thus, 1982 saw oil flowing from Emirates wells at about 63% of the volume produced in their most prolific year. There were a number of reasons for the reductions. Greatly increased prices for oil and conservation measures around the world resulted in reduced demand for all crude oil, and the reductions were sharply felt by the United Arab Emirates as a member of the Organization of Petroleum Exporting Countries (OPEC). Allowables agreed upon by the OPEC members reflected reduced demand, particularly during 1982. Proved reserves were not a factor in the reduced United Arab Emirates crude output. The country's reserves-to-production ratio indicated a 60-year supply in the ground.

Intense exploration efforts, both onshore and offshore throughout the federation, were resulting in upward revisions of proved crude reserves of the United Arab Emirates. Their economies were still heavily oriented to exported petroleum, despite concerted efforts to widen the income-producing base through development of other industries. There were two operating refineries in the Emirates, both in Abu Dhabi. Together, their output was enough to meet all Emirate demands and have a small amount to export.

Exploration.—For the most part, exploration for oil and gas, both onshore and offshore was active and successful. Discovered gas-bearing structures were described as enormous, but quite deep. The prolific Khuff formation was being probed, both onshore and offshore, at a number of points including where the Khuff underlies the Nasr and Abu al-Bukoosh Oilfields, and also at the onshore Bab area.

Two artificial islands, similar to those offshore the North American Arctic, were completed in the Persian Gulf off Abu Dhabi during the year. Costing $11 million, they were designed as bases for exploration and development drilling using less expensive land-type equipment. The two islands, Zubbaya and Halat Hail, were in shallow water. Two hundred seventy thousand cubic meters of fill material were dredged from the floor of the Persian Gulf and combined with 60,000 cubic meters of sand bags, concrete blocks, and protective fabrics to create the two 50,000-square-meter island work areas. Channels were dredged to the islands to provide access by tending vessels. Drilling at first was into proven reservoirs during 1982, but later in the year some exploratory drilling from the islands was begun. The islands were large enough to provide living quarters and material and equipment storage space. The islands were built for the Abu Dhabi Co. for Onshore Operations (ADCO) which conducted the drilling programs from the islands.

In 1981, there were 13 exploratory wells drilled in Abu Dhabi and 122 development wells. In 1982, it was reported that 38 drilling rigs were running in the Emirates, and exploration, development, and workovers were proceeding at a good pace.

Production.—As of July 1, there were 497 producing oil wells in the United Arab Emirates. Abu Dhabi had 352, Dubai had 141, and Sharjah had 4. Total production was 1.247 million barrels daily, which made the Emirates the Middle East's third largest crude producer after Saudi Arabia and Iran. The country was 15th among market economy oil-producing countries. Daily average oil production in 1982 was 17% below the 1981 level of 1.502 million barrels daily. Natural gas reserves, at 28.5 quadrillion cubic feet, put the United Arab Emirates in 15th place among world gas producing nations. Given the active pace of drilling and development, both onshore and offshore, the number of wells, proved reserves, and other data are subject to frequent change.

Front runner among oilfield production projects was Abu Dhabi's development program for the Upper Zakum Field in the Persian Gulf offshore about 70 kilometers from Abu Dhabi City. Costing about $5 billion when completed, the project was expected to be operational during 1983. The huge reservoir was so low in expulsive energy that secondary recovery techniques, notably the injection of about 1 million barrels of water per day, was being instituted at the outset. The field was expected to produce between 350,000 and 500,000 barrels of oil per day. The project involved 266 wells and 92 drilling and production platforms.

Meanwhile, the Emirates second most prolific oil-producing state, Dubai, was ac-

tively engaged in maintaining its output of crude from four offshore fields. The Dubai Petroleum Co. announced plans, under its largest budget ever, to install six new platforms and engage in much primary and secondary recovery drilling and development work. About 12 new wells were to be drilled during the year, some gas-lift facilities were to be completed, and necessary workover projects were underway. Dubai's daily crude production in 1982 was about the same as that of 1981.

In Sharjah, the Amoco Sharjah Oil Co., a subsidiary of Standard Oil Co. (Indiana), announced commencement of its onshore gas condensate field in July. At yearend, Amoco's wholly owned daily production from seven wells was 25,000 barrels of condensate. The product was being processed through facilities completed by Amoco during the year and shipped via company tanker to the Amoco Oil Co. refinery at Yorktown, Va. The natural gas produced in the operation was contracted to a Government-owned gas pipeline and distribution company that was to supply gas to five northern Emirates. Amoco continued exploration on its 600,000-acre onshore concession in Sharjah and performed seismic survey work on the 618,000-acre concession it held in Abu Dhabi, where exploratory drilling was planned.

Refining.—In Abu Dhabi, the ADNOC 120,000-barrel-per-day refinery in the Ruwais industrial complex became fully operational during 1982. Plans were almost immediately announced to install a hydrocracker to upgrade refinery fuel oil residues into lighter products. Added to this were plans to expand the Umm al-Nar refinery from 15,000 to 75,000 barrels per day, with completion scheduled by mid-1983. Cost was put at $200 million. Output of the two refineries was mostly destined for use within the United Arab Emirates.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from United Arab Emirates dirhams (UAED) to U.S. dollars at the rate of UAED3.67 = US$1.00.

[3]Engineering and Mining Journal. V. 184, No. 6, June 1982, p. 220.

The Mineral Industry of the United Kingdom

By Tatiana Karpinsky[1]

The gross domestic product (GDP) of the United Kingdom in real terms increased by an estimated 0.7% in 1982, and the inflation rate slowed to 6.5% at the end of the year.

In 1982, industrial output increased 1%, but steel production fell 12%, compared with that of 1981, and amounted to 13.7 million tons; total steel capacity was estimated at 25 million tons. The annual subsidy to state-owned British Steel Corp. (BSC) increased from $599 million to $1 billion.[2] The steel industry was heavily dependent upon imports of iron ore and important alloying metals such as chromium, manganese, columbium, and vanadium. During the year, the Government decided to build up and hold above-average stocks of those metals and minerals deemed to be of critical importance to steel and certain other key industries. The stockpile budget totaled about $82 million, and much of the stockpile had already been purchased by the end of 1982.

Oil development in the North Sea progressed; for the second year the United Kingdom was self-sufficient in crude oil and petroleum products, and about 600,000 barrels per day of crude oil was exported. Oil and gas accounted for 6.5% of the United Kingdom GDP and provided about 6% of all tax revenues in 1982.

Unemployment rose by about 25,000 workers per month through 1982 and reached 12.5% of the total work force.

PRODUCTION

The main factors in 1982 declines in minerals and metals production were additional sales from stocks and the recession in the United Kingdom's industrial activity. The total value of gross industrial production in 1981 amounted to $140 billion.[3] Mining and quarrying contributed an estimated 18% to this and 7.3% to the gross national product.

In 1982, refined production of aluminum, copper, lead, nickel, tin, and zinc was lower than in 1981 by varying amounts. The United Kingdom was self-sufficient in oil, coal, and fluorspar and produced about 27% of its tin requirements. Production of nonmetallic minerals was approximately at the level of 1981. Coal production dropped slightly. Production of oil increased by 16%, and for the first time the annual total topped 750 million barrels. Production of nuclear and hydroelectric energy rose about 15% to 18.3 million tons of standard coal equivalent (SCE).

Table 1.—United Kingdom: Production of mineral commodities[1]

(Thousand metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
METALS					
Aluminum:					
Alumina	94	88	102	90	[e]80
Metal:					
Primary—tons	346,200	359,474	374,446	339,183	[e]240,000
Secondary—do	193,748	176,696	162,056	148,009	[e]112,000
Cadmium including secondary—do	291	424	375	278	354
Copper:					
Ore and concentrate, metal content—do	135	[e]100	200	700	636
Metal, refined:					
Primary—do	46,158	48,512	68,290	59,834	63,200
Secondary—do	79,403	73,185	93,048	76,329	71,000
Total—do	125,561	121,697	161,338	136,163	134,200
Iron and steel:					
Iron ore—gross weight	4,239	4,268	916	731	470
Iron content	1,102	1,110	238	161	103
Metal:					
Pig iron	11,532	12,894	6,412	9,470	8,300
Ferroalloys, blast-furnace: Ferromanganese	69	136	52	84	61
Steel, crude	20,311	21,438	11,278	15,576	13,700
Semimanufactures:					
Sections	4,949	4,937	3,414	3,899	NA
Wire rods	1,423	1,760	972	1,103	NA
Plates and sheets	6,858	7,383	3,802	5,990	NA
Strip	1,144	1,134	413	249	NA
Pipe, tube, stock	727	647	433	642	NA
Railway track material	233	257	176	219	NA
Other rolled[2]	1,014	1,003	873	929	NA
Castings and forgings	307	275	252	210	NA
Total	16,655	17,396	10,335	13,241	15,000
Lead:					
Mine output, metal content—tons	4,582	4,701	[e]2,400	[e]2,400	[e]2,400
Metal:					
Bullion from imported ores and concentrates—do	30,371	32,314	30,039	26,556	34,100
Refined:					
Primary[3]—do	122,841	124,138	113,405	135,369	125,000
Secondary[4]—do	222,947	244,192	211,385	197,992	168,400
Total—do	345,788	368,330	324,790	333,361	293,400
Magnesium metal including secondary—do	2,700	2,700	2,700	1,900	1,758
Nickel, refined—do	21,367	18,863	19,300	25,400	6,900
Silver—thousand troy ounces	41	NA	NA	61	96
Tin:					
Mine output, metal content—tons	3,132	2,373	2,982	3,869	[e]4,000
Metal:					
Primary—do	8,445	8,025	5,829	6,839	[e]5,600
Secondary—do	2,711	3,367	5,535	6,071	[e]5,200
Tungsten, mine output, metal content—do	65	66	[e]70	[e]70	NA
Zinc:					
Ore and concentrate, metal content—do	2,718	572	4,400	10,900	10,200
Metal, smelter—do	73,575	76,686	86,682	81,650	79,300
NONMETALS					
Barite and witherite	54	45	54	63	[e]65
Bromine—tons	25,100	29,200	[r]26,400	27,600	[e]27,000
Calcite	13	21	18	18	[e]20
Cement, hydraulic	15,916	16,140	14,808	12,828	12,962
Chalk	16,731	16,265	14,049	11,756	[e]12,000
Clays:					
Fire clay	1,404	1,711	1,217	992	[e]1,000
Fuller's earth	218	220	210	205	[e]200
Kaolin (china clay)	4,199	4,444	3,964	3,800	[e]3,400
Pottery clay and ball clay	16	22	NA	[e]12	[e]20
Other including clay shale	25,473	21,644	[r]19,811	18,400	[e]18,000
Diatomite—tons	2,000	1,000	1,000	1,000	[e]1,000
Feldspar (china stone)[e]—do	50,000	50,000	50,000	50,000	NA
Fluorspar:					
Acid-grade	130	104	137	88	NA
Metallurgical-grade	16	12	10	5	NA
Ungraded	27	23	24	23	NA
Total	173	139	171	116	[e]180

See footnotes at end of table.

Table 1.—United Kingdom: Production of mineral commodities[1] —Continued

(Thousand metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981	1982[p]
NONMETALS —Continued					
Gypsum and anhydrite[5]	3,332	3,500	r3,447	2,944	e2,700
Lime: Quicklime and hydrated lime	3,148	3,310	3,980	e3,000	e3,000
Nitrogen: N content of ammonia	1,600	1,666	1,633	1,780	e1,716
Potash, K_2O equivalent	r157	r277	r321	285	400
Refractory products:[6]					
Brick	665	681	r491	--	NA
Cement	54	66	r47	NA	NA
Other	460	462	r375	NA	NA
Salt:					
Rock	1,311	1,590	1,746	1,350	e1,600
Brine (in brine for purposes other than saltmaking)	1,760	1,915	1,608	1,454	e1,400
Other	4,239	4,315	3,800	3,916	e3,900
Sodium compounds: Sodium carbonate[e]	1,600	1,400	1,360	1,300	1,300
Stone, sand and gravel:					
Chert and flint	52	47	14	10	e10
Igneous rock	32,250	36,178	34,676	30,772	e32,000
Limestone and dolomite	88,819	92,069	r88,773	79,067	e82,000
Sandstone including ganister	13,407	13,544	12,597	12,233	e13,000
Slate	945	513	225	350	NA
Crushed rock, not further described	98,721	102,991	102,533	92,000	105,000
Sand and gravel:					
Common sand and gravel	110,200	111,600	r104,467	93,099	e101,000
Special sands	6,224	5,829	5,708	e6,000	e4,500
Strontium minerals —tons	4,300	6,100	6,700	15,000	18,000
Sulfur, byproduct:					
Of metallurgy	44	56	e50	e50	e50
Of spent oxides	5	4	4	e4	e4
Of petroleum refinery	56	53	80	75	e85
Total	105	113	e134	e129	139
Talc, soapstone, pyrophyllite —tons	18,000	16,600	17,300	18,000	e18,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	199	200	172	153	e150
Coal:					
Anthracite	2,952	3,030	2,902	2,123	e2,100
Bituminous	118,743	117,607	125,307	123,178	e120,600
Other	1,882	1,732	r1,876	2,063	e2,000
Total	123,577	122,369	r130,085	127,364	124,700
Coke:					
Metallurgical	9,879	10,259	7,829	7,184	e7,100
Breeze, all types	972	853	673	603	e600
Fuel briquets, all grades	2,597	2,389	r2,484	2,065	e2,000
Gas:					
Manufactured[7] —million therms	42	25	20	19	NA
Natural:					
Gross —million cubic feet	1,548,859	1,675,673	e1,564,451	e1,569,065	NA
Marketed —do	1,382,315	1,410,285	2,316,878	1,320,762	NA
Natural gas liquids —thousand 42-gallon barrels	3,050	3,468	e3,500	e3,500	NA
Petroleum and refinery products:					
Crude including field condensate —do	388,538	561,656	586,040	655,302	NA
Refinery products:					
Gasoline:					
Aviation —do	329	570	534	505	NA
Motor —do	155,950	136,374	140,667	145,694	NA
Jet fuel —do	38,872	42,584	41,632	36,472	NA
Kerosine —do	20,166	20,995	15,764	14,756	NA
Distillate fuel oil —do	175,219	189,850	165,261	149,401	NA
Residual fuel oil —do	203,250	190,476	157,842	127,000	NA
Lubricants —do	8,412	9,310	8,750	7,441	NA
Other —do	75,506	89,225	61,885	e46,910	NA
Refinery fuel and losses —do	48,178	45,766	44,219	49,005	NA
Total —do	725,882	725,150	636,554	e577,184	NA

eEstimated. pPreliminary. rRevised. NA Not available.

[1]Includes data available through June 1, 1983.

[2]Includes wheels, centers, tires, axles, and semimanufactures for immediate sale.

[3]From imported bullion, including Pb content of alloys produced.

[4]From scrap materials. Series revised to comprise all secondary output including Pb content of secondary antimonial lead and to exclude output from domestic ores.

[5]Excludes plasters.

[6]Consists of brick, retorts, molds, and other refractory products made from clays, silica, siliceous materials, magnesite, alumina, and chrome materials.

[7]Gas made at gasworks plus purchased coke oven refinery gas.

TRADE

Trade data in minerals and metals for 1981, the latest year available, are given in tables 2 and 3.

Table 2.—United Kingdom: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981[1]	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Lithium, oxides and hydroxides	NA	7	NA	NA.
Unspecified	172	115	15	Australia 15; Poland 15; Republic of South Africa 14.
Aluminum:				
Ore and concentrate	1,221	883	5	United Arab Emirates 500; Belgium-Luxembourg 218; Sweden 155.
Oxides and hydroxides	42,670	39,622	811	Norway 7,017; Republic of South Africa 4,727; Portugal 3,952.
Metal including alloys:				
Scrap	35,731	38,008	42	West Germany 22,108; Netherlands 4,325; France 3,757.
Unwrought	194,456	168,537	8,044	Netherlands 61,308; West Germany 42,085; Japan 12,820.
Semimanufactures	184,980	81,395	2,164	West Germany 9,956; France 8,222; Ireland 7,295.
Antimony: Metal including alloys, all forms	288	30	NA	NA.
Beryllium:				
Oxides and hydroxides	NA	1	NA	NA.
Metal including alloys, all forms	5	11	1	France 3; India 2; Netherlands 2.
Bismuth: Metal including alloys, all forms	312	311	NA	NA.
Cadmium: Metal including alloys, all forms	133	37	NA	NA.
Chromium:				
Ore and concentrate	891	1,192	--	Turkey 780; Spain 284.
Oxides and hydroxides	4,785	1,773	1,237	Canada 197; France 189.
Metal including alloys, all forms	2,569	2,123	NA	NA.
Cobalt:				
Oxides and hydroxides	289	838	97	Belgium-Luxembourg 166; France 103; Netherlands 81.
Metal including alloys, all forms	623	810	NA	NA.
Columbium and tantalum: Metals including alloys, all forms	34	29	6	Australia 13; West Germany 4.
Copper:				
Ore and concentrate	--	4	--	All to United Arab Emirates.
Matte and speiss including cement copper	4	--		
Oxides and hydroxides	NA	255	NA	NA.
Sulfate	NA	4,803	NA	NA.
Metal including alloys:				
Scrap	82,903	65,562	(2)	West Germany 26,367; Italy 12,598; Belgium-Luxembourg 8,387.
Unwrought	60,540	43,035	2,432	West Germany 12,651; Italy 4,644; Sweden 3,994.
Semimanufactures	119,868	97,747	8,834	West Germany 14,851; Ireland 11,505; Switzerland 8,506.
Gold:				
Waste and sweepings value, thousands	$91,217	$28,480	NA	Spain $18,683; Switzerland $4,125; West Germany $2,312.
Metal including alloys, unwrought and partly wrought thousand troy ounces	10,881	22,213	NA	NA.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	1,156	20,033	--	Switzerland 20,000.
Metal:				
Scrap thousand tons	2,805	3,367	(2)	Spain 2,156; Netherlands 167; India 142.
Pig iron, cast iron, related materials	55,788	38,156	153	Italy 7,830; Belgium-Luxembourg 5,615; Sweden 4,481.
Ferroalloys:				
Ferromanganese	972	21,588	15,768	West Germany 3,823.
Ferrosilicon	1,353	2,889	NA	NA.
Unspecified	15,634	12,774	783	West Germany 4,802; Netherlands 1,165; Sweden 958.
Steel, primary forms	242,678	273,313	53,590	West Germany 47,912; Yugoslavia 35,199; Italy 33,132.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	r1,236	1,625	302	India 127; West Germany 102; Ireland 101.

See footnotes at end of table.

Table 2.—United Kingdom: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[1]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Universals, plates, sheets thousand tons	657	1,240	47	West Germany 185; Canada 116; France 77.
Hoop and strip	78,701	98,579	4,668	Ireland 10,954; France 10,773; U.S.S.R. 6,010.
Rails and accessories	103,448	125,781	3,169	Pakistan 21,889; Belgium-Luxembourg 20,505; Sudan 18,583.
Wire	89,475	96,727	16,983	Canada 10,868; Ireland 8,550; Sweden 4,933.
Tubes, pipes, fittings	404,275	795,320	110,746	Sweden 24,645; Abu Dhabi 23,313; Denmark 18,420.
Castings and forgings, rough	95,873	82,342	28,033	Sweden 13,351; France 7,154; Iraq 4,902.
Lead:				
Ore and concentrate	3,535	2,378	--	Belgium-Luxembourg 2,309; Singapore 44.
Oxides	5,855	6,423	--	Ireland 2,668; U.S.S.R. 500; Norway 489.
Metal including alloys:				
Scrap	30,662	18,221	--	West Germany 6,074; Ireland 5,559; Denmark 4,060.
Unwrought	141,825	130,120	1,705	West Germany 32,220; Netherlands 14,775; France 13,633.
Semimanufactures	6,123	2,063	68	Portugal 737; Ireland 163.
Magnesium: Metal including alloys:				
Scrap	111	182	32	Netherlands 125; Belgium-Luxembourg 18.
Unwrought	1,167	757	242	West Germany 154; France 140; Canada 86.
Semimanufactures	659	638	18	Ireland 132; Egypt 112; Hungary 93.
Manganese:				
Ore and concentrate, metallurgical-grade	8,331	6,197	--	Republic of South Africa 2,681; unspecified 3,516.
Oxides	2,133	341	6	Ireland 110; Nigeria 70; West Germany 36.
Metal including alloys, all forms	405	147	NA	NA.
Mercury 76-pound flasks	2,321	2,030	NA	Netherlands 811; Republic of South Africa 522.
Metalloids:				
Arsenic, oxides and acids	2,695	3,603	NA	NA.
Unspecified	2,604	2,409	17	Denmark 1,365; West Germany 79; unspecified 909.
Molybdenum:				
Oxides and hydroxides	1,937	1,086	NA	NA.
Metal including alloys, all forms	175	196	12	Netherlands 54; West Germany 48.
Nickel:				
Ore and concentrate	5	61	--	France 23; West Germany 20; Sweden 18.
Matte and speiss	2,911	4,941	--	Norway 3,579; Belgium-Luxembourg 1,128.
Oxides and hydroxides	58	162	NA	NA.
Metal including alloys:				
Scrap	4,454	4,195	679	West Germany 1,234; Sweden 814; France 276.
Unwrought	10,984	20,379	892	West Germany 4,124; Canada 2,595; Belgium-Luxembourg 2,492.
Semimanufactures	9,136	9,735	879	France 2,115; West Germany 1,223; Japan 1,153.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified thousand troy ounces	1,768	1,382	354	Japan 225; Switzerland 225; West Germany 193.
Silver:				
Ore and concentrate value, thousands	$1,000	$414	--	West Germany $181; France $121; Hong Kong $81.
Waste and sweepings do	$144,798	$28,159	$509	Spain $12,429; France $4,787; Belgium-Luxembourg $3,872.
Metal including alloys, unwrought and partly wrought thousand troy ounces	82,242	61,312	NA	Switzerland 42,600; France 9,645.
Tin:				
Ore and concentrate	3,035	4,306	40	Spain 1,789; West Germany 1,569; Netherlands 790.
Oxides	451	481	NA	NA.

See footnotes at end of table.

Table 2.—United Kingdom: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[1]	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys:				
Scrap	115	143	--	Netherlands 120; West Germany 22.
Unwrought	8,234	7,699	250	U.S.S.R. 4,846; West Germany 532.
Semimanufactures	635	369	2	Norway 66; Italy 65; West Germany 63.
Titanium: Oxides	14,038	12,502	3,213	Netherlands 2,378; Ireland 1,149; Hungary 1,058.
Tungsten:				
Ore and concentrate	222	662	16	U.S.S.R. 556; Netherlands 34.
Oxides and hydroxides	1	20	NA	NA.
Metal including alloys, all forms	333	346	121	West Germany 154.
Uranium and/or thorium:				
Ore and concentrate, value, thousands	$8	$2	--	All to West Germany.
Metal including alloys, all forms	20	10	NA	NA.
Vanadium: Oxides and hydroxides	NA	102	NA	NA.
Zinc:				
Ore and concentrate	7,695	26,297	--	France 20,815; Belgium-Luxembourg 5,460.
Oxides	9,331	9,972	446	Belgium-Luxembourg 1,612; Switzerland 998; unspecified 4,466.
Blue powder	2,162	1,970	695	NA.
Metal including alloys:				
Scrap	5,400	8,441	39	West Germany 7,342; Netherlands 407.
Unwrought	34,468	33,177	8,310	Netherlands 5,782; France 5,423; Belgium-Luxembourg 3,751.
Semimanufactures	3,152	3,098	87	Nigeria 748; Iran 535; West Germany 404.
Other:				
Ores and concentrates	5,594	5,363	109	Netherlands 1,485; West Germany 857; Spain 694.
Oxides and hydroxides	2,101	1,139	NA	NA.
Ashes and residues	46,020	43,371	256	West Germany 19,545; Belgium-Luxembourg 5,439; unspecified 9,659.
Pyrophoric alloys	10,325	11,570	NA	West Germany 5,755; Ireland 1,134; India 572.
Base metals including alloys, all forms	140	215	NA	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,203	3,071	NA	NA.
Artificial: Corundum	6,744	5,484	738	Republic of South Africa 1,639; West Germany 902.
Dust and powder of precious and semi-precious stones, including diamond value, thousands	$4,646	$4,390	$204	Belgium-Luxembourg $1,097; Italy $712; unspecified $2,377.
Grinding and polishing wheels and stones	7,281	6,584	395	U.S.S.R. 1,053; France 856; Sweden 666.
Asbestos, crude	1,118	1,758	--	Belgium-Luxembourg 1,365; Malaysia 152.
Barite and witherite	4,050	4,226	--	West Germany 1,124; Republic of South Africa 735; Hong Kong 412.
Boron materials:				
Crude natural borates	1,517	1,167	--	Republic of South Africa 1,123; Ireland 44.
Oxides and acids	1,514	1,142	4	Netherlands 1,086.
Cement thousand tons	1,025	557	66	Nigeria 435; Ireland 14; unspecified 37.
Chalk	57,742	52,615	921	Nigeria 19,575; Australia 8,936; unspecified 23,183.
Clays and clay products:				
Crude, unspecified thousand tons	2,957	5,626	18	Italy 1,927; Finland 1,005; West Germany 980.
Products:				
Nonrefractory	182,521	163,498	11,425	Ireland 56,898; Dubai 8,759; Saudi Arabia 7,449.
Refractory including nonclay brick	249,937	193,236	6,209	Italy 22,288; Sweden 12,612; West Germany 11,853.
Cryolite and chiolite	3	1	--	All to Egypt.
Diamond:				
Gem, not set or strung, value, millions	$6,568	$1,700	$279	Belgium-Luxembourg $525; Switzerland $477; India $186.
Industrial value, thousands	$68,625	$49,976	$8,836	Belgium-Luxembourg $15,079; Romania $4,733; Ireland $3,508.

See footnotes at end of table.

Table 2.—United Kingdom: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[1]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diatomite and other infusorial earth	985	1,367	787	Republic of South Africa 229; Ireland 129.
Feldspar, fluorspar, related materials:				
Unspecified	59,229	30,473	3	Netherlands 13,155; West Germany 9,883; unspecified 7,432.
Fertilizer materials:				
Crude, unspecified	2,481	3,051	59	Ireland 1,981; Syria 316; France 313.
Manufactured:				
Ammonia	102,581	240,349	--	Spain 82,593; Finland 39,875; Ireland 19,529.
Nitrogenous	118,186	206,399	265	Belgium-Luxembourg 105,538; Netherlands 40,467; Peru 16,800.
Phosphatic	25,955	10,251	--	Ireland 8,619; West Germany 1,052.
Potassic	200,695	92,531	163	Norway 25,722; Netherlands 24,044; Brazil 15,000.
Unspecified and mixed	301,952	321,911	1,070	Ireland 143,762; West Germany 50,884; Nigeria 49,774.
Graphite, natural	2,081	2,923	65	West Germany 1,386; unspecified 1,472.
Gypsum and plaster	17,889	18,412	140	Ireland 4,898; unspecified 13,374.
Halogens:				
Chlorine	4,045	2,740	--	Ireland 1,530; unspecified 1,210.
Unspecified	2,026	1,464	22	West Germany 511; France 362; Libya 200.
Lime	32,724	35,980	--	Nigeria 12,992; Iran 4,525; Sweden 3,229.
Magnesium compounds: Other	80,042	71,570	NA	NA.
Mica:				
Crude including splittings and waste	3,773	2,926	36	West Germany 792; Nigeria 390; Portugal 312.
Worked including agglomerated splittings	231	82	1	West Germany 16; Italy 10; Singapore 9.
Nitrates, crude	137	2,098	8	Ireland 1,116; Malta 680; West Germany 180.
Phosphates, crude	94	785	--	Australia 688; New Zealand 62.
Pigments, mineral: Iron oxides and hydroxides, processed	7,208	5,571	559	Republic of South Africa 972; Italy 601; unspecified 3,439.
Potassium salts, crude	35	20	--	All to Ireland.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$126,653	$139,899	$19,164	Switzerland $83,051; Hong Kong $10,210; France $5,615.
Synthetic do	$440	$1,194	$1	Ireland $730; Japan $175; France $169.
Pyrite, unroasted	20	1,653	--	Ireland 1,640.
Salt and brine	393,323	426,479	17	Ireland 140,117; Nigeria 124,808; Sweden 105,605.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,618	1,676	1	Ireland 397; Netherlands 54; unspecified 1,152.
Sodium carbonate, natural and manufactured	149,910	135,482	18	Republic of South Africa 46,176; Sweden 20,001; Ireland 16,616.
Sodium hydroxide	45,891	43,700	19	Nigeria 6,020; Netherlands 4,358; Ireland 3,899.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	8,368	6,443	360	West Germany 1,790; Ireland 1,634; France 963.
Worked	7,746	7,703	858	Australia 1,558; France 1,293; Netherlands 735.
Dolomite, chiefly refractory-grade	30,116	18,580	--	Norway 6,654; Ireland 5,519; unspecified 6,407.
Gravel and crushed rock thousand tons	6,814	3,208	136	Belgium-Luxembourg 1,544; France 866; Netherlands 507.
Limestone other than dimension	799,103	547,907	--	Belgium-Luxembourg 225,231; Norway 157,827; unspecified 164,849.
Quartz and quartzite	277	138	18	United Arab Emirates 79; Romania 29.
Sand other than metal-bearing	48,199	43,026	--	Ireland 17,529; Sweden 11,223; unspecified 12,995.

See footnotes at end of table.

Table 2.—United Kingdom: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[1]	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	1,116	1,095	--	Republic of South Africa 428; Belgium-Luxembourg 393.
Colloidal, precipitated, sublimed	133	128	--	Ireland 52; Iran 28; Switzerland 18.
Dioxide	90	91	NA	NA.
Sulfuric acid	228,676	69,679	1	Ireland 27,687; unspecified 41,991.
Talc, steatite, soapstone, pyrophyllite	5,806	6,902	--	Netherlands 2,054; Ireland 1,402; Nigeria 909.
Other:				
Crude	32,620	36,641	105	Netherlands 7,469; West Germany 7,273; unspecified 16,807.
Slag and dross, not metal-bearing	84,878	91,311	120	West Germany 64,716; Denmark 12,505; Sweden 6,805.
Oxides and hydroxides of barium, magnesium, strontium	581	616	76	West Germany 226; Ireland 67; Ghana 62.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	92,298	77,231	3,034	Ireland 14,181; Hong Kong 7,799; West Germany 3,962.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,887	1,865	--	Ireland 607; France 400; Nigeria 158.
Carbon: Carbon black	35,195	29,499	383	Ireland 6,264; France 3,465; Nigeria 3,406.
Coal:				
Anthracite and bituminous thousand tons	4,042	9,513	--	France 2,623; Denmark 1,917; West Germany 1,498.
Briquets of anthracite and bituminous coal	118,881	104,019	4	Norway 76,318; Venezuela 11,878; Ireland 9,768.
Lignite including briquets	120	54	--	Norway 53.
Coke and semicoke thousand tons	1,164	3,391	--	Norway 2,224; Romania 404; Netherlands 296.
Hydrogen, helium, rare gases	5,135	5,018	4	Ireland 1,999; Norway 1,174; Spain 575.
Peat including briquets and litter	5,105	4,198	--	France 1,939; Ireland 1,090; Oman 229.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	291,566	394,036	120,463	West Germany 92,669; Netherlands 64,479; France 22,955.
Refinery products:				
Liquefied petroleum gas do	11,839	12,602	269	Netherlands 3,823; Ireland 1,483; Portugal 1,457.
Gasoline:				
Aviation do	7,035	11,339	NA	Ireland 5,181; West Germany 1,233; Netherlands 1,082.
Motor do	9,847	8,541	140	Netherlands 3,245; Sweden 1,804; Belgium-Luxembourg 1,446.
Mineral jelly and wax do	349	381	20	France 56; Nigeria 49; West Germany 43.
Kerosine and jet fuel do	6,090	4,298	--	Ireland 2,218; Egypt 501; Denmark 323.
Distillate fuel oil do	37,654	38,147	1,034	Ireland 7,518; Netherlands 6,006; Sweden 5,180.
Lubricants do	10,037	5,061	70	Netherlands 597; West Germany 377; Sweden 352.
Residual fuel oil do	35,203	25,803	347	Netherlands 9,516; Ireland 7,188; Belgium-Luxembourg 2,809.
Bitumen and other residues do	634	502	--	Ireland 432; Abu Dhabi 46.
Bituminous mixtures do	276	234	(2)	Ireland 51; Greece 21; Abu Dhabi 19.
Petroleum coke do	2,047	2,054	NA	NA.
Tars and other crude chemicals derived from coal, gas, and petroleum	222,264	382,836	414	Netherlands 217,506; Norway 40,320; France 20,257.

[r]Revised. NA Not available.
[1]May include other precious metals.
[2]Less than 1/2 unit.

Table 3.—United Kingdom: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	879	142	--	West Germany 47; France 37; unspecified 45.
Aluminum:				
Ore and concentrate	267,634	240,687	35	Ghana 136,706; Greece 70,400; Guinea 19,597.
Oxides and hydroxides	778,909	636,159	5,264	Jamaica 560,349; Suriname 37,728; Guyana 14,100.
Metal including alloys:				
Scrap	5,792	4,040	122	Ireland 2,238; Netherlands 501; Belgium-Luxembourg 218.
Unwrought	171,420	123,347	1,108	Norway 78,713; Iceland 10,893; France 9,930.
Semimanufactures	155,465	169,504	14,725	West Germany 50,277; France 24,895; Belgium-Luxembourg 22,089.
Beryllium: Metal including alloys, all forms	10	3	3	
Bismuth: Metal including alloys, all forms	389	292	NA	NA.
Cadmium: Metal including alloys, all forms	793	982	NA	NA.
Chromium:				
Ore and concentrate	92,573	76,495	--	Republic of South Africa 52,674; Mozambique 6,955; Finland 5,604.
Oxides and hydroxides	2,255	2,309	59	West Germany 1,045; U.S.S.R. 544; Netherlands 231.
Metal including alloys, all forms[1]	25	1	NA	NA.
Cobalt:				
Oxides and hydroxides	1,333	891	1	Canada 846; West Germany 17; France 14.
Metal including alloys, all forms	2,187	1,439	NA	NA.
Columbium and tantalum: Metals including alloys, all forms	59	36	15	West Germany 9; France 7; Belgium-Luxembourg 3.
Copper:				
Ore and concentrate	644	561	(2)	Czechoslovakia 536; Belgium-Luxembourg 20.
Matte and speiss including cement copper	--	9	--	All from Philippines.
Metal including alloys:				
Scrap	9,171	8,142	963	Ireland 1,884; Ghana 680; France 541.
Unwrought	346,703	283,803	2,487	Canada 75,721; Chile 57,085; Peru 35,948.
Semimanufactures	77,817	88,494	3,642	West Germany 27,990; France 18,192; Belgium-Luxembourg 9,928.
Gold:				
Waste and sweepings value, thousands	$269,409	$148,751	$76,578	Sweden $23,889; Kuwait $14,891; Canada $14,420.
Metal including alloys, unwrought and partly wrought thousand troy ounces	19,842	20,643	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	8,529	14,582	(2)	Canada 5,434; Brazil 1,845; Sweden 1,789.
Pyrite, roasted	218,087	265,906	--	Sweden 247,951; Ireland 16,146.
Metal:				
Scrap	26,439	20,760	367	Ireland 13,289; Sierra Leone 2,862; West Germany 1,867.
Pig iron, cast iron, related materials	192,038	128,716	358	West Germany 33,901; Norway 33,516; Sweden 20,880.
Ferroalloys:				
Ferromanganese	52,005	56,412	--	Republic of South Africa 31,420; Norway 17,071; France 5,872.
Ferrosilicon	68,997	75,443	NA	NA.
Unspecified	83,378	103,829	46	Norway 26,991; Sweden 26,596; unspecified 31,559.
Steel, primary forms	901,897	739,113	8:5	West Germany 304,499; Netherlands 205,019; Belgium-Luxembourg 55,384.
Semimanufactures:				
Bars, rods, angles, shapes, sections	928,251	769,479	7,586	West Germany 129,782: France 110,922; Belgium-Luxembourg 109,330.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Universals, plates, sheets thousand tons	2,126	1,310	48	West Germany 321; Netherlands 240; Belgium-Luxembourg 216.
Hoop and strip	219,143	136,645	3,029	West Germany 74,625; Belgium-Luxembourg 20,498; France 12,642.
Rails and accessories	5,915	3,960	36	West Germany 3,081; Belgium-Luxembourg 311; Ireland 242.
Wire	61,659	54,193	581	Belgium-Luxembourg 14,625; West Germany 12,065; France 11,234.
Tubes, pipes, fittings	468,082	651,610	8,405	West Germany 341,106; Italy 71,382; Netherlands 70,385.
Castings and forgings, rough	21,170	18,346	479	West Germany 5,055; France 2,811; Italy 1,590.
Lead:				
Ore and concentrate	56,060	59,832	--	Australia 26,402; Canada 9,237; Sweden 6,007.
Oxides	672	736	6	West Germany 368; Netherlands 281; Ireland 36.
Metal including alloys:				
Scrap	10,571	788	63	Ireland 267; Nigeria 123; Sweden 62.
Unwrought	204,215	162,443	232	Australia 123,307; Canada 34,824; Ireland 2,126.
Semimanufactures	2,848	2,725	53	Ireland 1,591; West Germany 450; Netherlands 249.
Magnesium: Metal including alloys:				
Scrap	43	39	--	Italy 18; Ireland 10; Australia 4.
Unwrought	4,974	4,900	461	Norway 2,106; Netherlands 1,153; Canada 1,066.
Semimanufactures	245	243	39	Switzerland 63; China 35; France 33.
Manganese:				
Ore and concentrate, metallurgical-grade	126,549	278,055	60	Republic of South Africa 112,898; Brazil 107,261; Australia 43,561.
Oxides	5,576	3,924	290	Belgium-Luxembourg 1,746; Ireland 829; Greece 472.
Metal including alloys, all forms	3,291	1,962	NA	NA.
Mercury 76-pound flasks	6,730	6,003	290	Netherlands 3,248; Spain 1,160; China 406.
Metalloids: Arsenic, oxides and acids	5,454	--		
Molybdenum:				
Ore and concentrate	13,757	15,148	NA	NA.
Metal including alloys, all forms	108	178	33	Austria 40; West Germany 37; France 25.
Nickel:				
Ore and concentrate	--	179	--	All from Netherlands.
Matte and speiss	38,325	41,233	--	Canada 34,454; Indonesia 5,064; Australia 1,241.
Metal including alloys:				
Scrap	2,255	2,432	383	France 500; Netherlands 494; West Germany 232.
Unwrought	18,240	17,160	108	Norway 5,542; Netherlands 3,364; Canada 3,290.
Semimanufactures	4,629	2,570	1,017	West Germany 1,064; France 134; Sweden 103.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified troy ounces	707,315	385,812	32,151	Switzerland 64,302; France 32,151; Republic of South Africa 32,151.
Silver:				
Ore and concentrate value, thousands	$463,148	$354,386	NA	NA.
Waste and sweepings do	$401,682	$334,393	NA	NA.
Metal including alloys, unwrought and partly wrought thousand troy ounces	139,566	63,241	4,469	Belgium-Luxembourg 10,417; France 9,195; Hong Kong 5,787.
Tin:				
Ore and concentrate	36,656	38,407	NA	Bolivia 28,066; Argentina 6,205; Republic of South Africa 2,172.
Metal including alloys:				
Scrap	940	1,005	297	France 121; Hong Kong 110; Poland 107.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys —Continued				
Unwrought	r7,129	8,151	66	Netherlands 1,946; Nigeria 1,834; Indonesia 1,365.
Semimanufactures	243	102	4	West Germany 59; Netherlands 12; France 5.
Titanium:				
Ore and concentrate	312,650	288,700	--	NA.
Oxides	5,680	9,636	4,153	Belgium-Luxembourg 1,747; West Germany 1,084; Canada 594.
Metal including alloys, all forms[3]	1,999	2,083	NA	NA.
Tungsten:				
Ore and concentrate	2,622	3,308	--	Bolivia 1,604; Portugal 525; China 500.
Metal including alloys, all forms	298	162	11	Austria 31; West Germany 25; Israel 19.
Uranium and/or thorium:				
Ore and concentrate value, thousands	$412	$1,415	--	All from Australia.
Metal including alloys, all forms do	$38	$85	$4	West Germany $60; Canada $15.
Zinc:				
Ore and concentrate	211,599	131,803	2,687	Peru 49,059; Australia 31,975; Iceland 26,110.
Oxides	2,871	3,015	5	West Germany 1,321; Portugal 715; France 455.
Blue powder value, thousands	$511	$1,586	NA	Belgium-Luxembourg $870; unspecified $716.
Metal including alloys:				
Scrap	1,136	925	--	Netherlands 440; Sweden 126; Finland 75.
Unwrought	134,273	120,278	3	Netherlands 37,786; Canada 32,199; Finland 27,984.
Semimanufactures value, thousands	(4)	$6,142	$248	West Germany $2,763; Belgium-Luxembourg $1,092; France $748.
Zirconium:				
Ore and concentrate	32,426	27,615	NA	NA.
Metal including alloys, all forms	207	112	NA	NA.
Other:				
Ores and concentrates	131	305	NA	NA.
Oxides and hydroxides	267,194	148,724	--	West Germany 21,081; France 18,025; unspecified 81,469.
Ashes and residues	78,583	46,884	14,466	Sweden 7,937; West Germany 5,082; Australia 2,333.
Pyrophoric alloys	3,119	NA		
Base metals including alloys, all forms	367	889	NA	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$9,691	$7,016	NA	NA.
Artificial: Corundum	17,543	10,687	192	Canada 4,240; Netherlands 2,623; France 1,637.
Dust and powder of precious and semi-precious stones, including diamond value, thousands	$18,638	$13,975	NA	NA.
Grinding and polishing wheels and stones	4,314	4,944	151	West Germany 810; France 797; Netherlands 748.
Asbestos, crude	94,639	67,187	241	Canada 51,224; Republic of South Africa 5,815; Zimbabwe 4,783.
Barite and witherite	143,090	113,007	--	Ireland 72,900; Netherlands 18,333; Morocco 6,007.
Boron materials:				
Crude natural borates	9,246	9,937	3,374	Netherlands 3,936; West Germany 1,813.
Oxides and acids	2,518	3,696	1	Turkey 2,347; U.S.S.R. 400; France 289.
Cement	118,167	188,074	563	Ireland 129,536; Netherlands 33,411; West Germany 10,973.
Chalk	605	801	--	West Germany 585; France 190; Netherlands 22.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude, unspecified	196,416	160,663	65,043	France 32,573; Greece 24,341; Republic of South Africa 18,113.
Products:				
Nonrefractory	93,270	107,931	66	Italy 49,409; West Germany 10,615; Netherlands 10,062.
Refractory including nonclay brick	45,906	55,909	2,905	Ireland 21,913; West Germany 13,873; Denmark 4,001.
Cryolite and chiolite	1,627	1,651	--	Denmark 1,418; Canada 195.
Diamond:				
Gem, not set or strung value, millions	$6,914	$1,872	$104	Switzerland $1,146; Sierra Leone $64; Republic of South Africa $57.
Industrial value, thousands	$147,829	$53,185	NA	NA.
Diatomite and other infusorial earth	13,602	12,296	3,541	Denmark 5,406; France 1,862; Spain 720.
Feldspar, fluorspar, related materials:				
Unspecified	144,008	118,604	142	Norway 70,235; Finland 25,990; Sweden 9,605.
Fertilizer materials:				
Crude, unspecified	646	1,204	--	Ireland 1,072; Israel 72; Belgium-Luxembourg 41.
Manufactured:				
Nitrogenous	355,567	327,066	1	Netherlands 121,234; Belgium-Luxembourg 117,313; West Germany 29,065.
Phosphatic	75,987	81,336	29	Belgium-Luxembourg 26,751; Netherlands 25,163; Portugal 6,783.
Potassic	554,775	479,784	1	East Germany 224,983; West Germany 108,163; Spain 48,925.
Unspecified and mixed	363,800	407,770	343	Netherlands 137,237; Ireland 81,392; Belgium-Luxembourg 70,492.
Graphite, natural	18,115	15,529	525	Madagascar 4,436; Norway 4,273; China 2,170.
Gypsum and plaster	85,652	48,596	321	Ireland 22,670; France 22,186; West Germany 3,264.
Halogens:				
Bromine	4,642	5,026	NA	NA.
Chlorine	5,208	8,695	1	Spain 8,640; France 38.
Iodine	1,596	1,358	NA	NA.
Lime	1,374	1,029	5	France 619; Ireland 170; Netherlands 162.
Magnesium compounds: Other	94,176	95,709	479	Greece 26,237; Spain 25,708; Ireland 16,101.
Mica:				
Crude including splittings and waste	21,223	13,895	49	China 6,869; Spain 2,645; France 2,414.
Worked including agglomerated splittings	506	456	57	West Germany 120; Belgium-Luxembourg 107; Switzerland 64.
Nitrates, crude	6,921	6,923	--	Chile 4,160; Belgium-Luxembourg 2,751.
Phosphates, crude thousand tons	1,755	1,456	--	Morocco 986; Senegal 381; Netherlands 12.
Pigments, mineral:				
Natural, crude	2,848	1,547	NA	NA.
Iron oxides and hydroxides, processed	22,137	20,014	580	West Germany 16,919; Spain 1,034; Netherlands 511.
Potassium salts, crude	25,453	25,011	--	West Germany 14,334; East Germany 10,677.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$126,662	$172,646	$23,556	Switzerland $117,146; France $5,029; West Germany $4,212.
Synthetic do	$1,677	$1,241	$932	Austria $133; Switzerland $58; Japan $24.
Salt and brine	434,427	97,923	336	Italy 42,074; West Germany 40,830; Netherlands 7,200.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	2,778	3,206	2	France 1,550; West Germany 527; Italy 255.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s. —Continued				
Sodium carbonate, natural and manufactured	34,089	70,892	45,688	Bulgaria 5,982; Poland 4,749; Netherlands 4,700.
Sodium hydroxide	63,952	135,446	14	West Germany 96,155; Netherlands 12,243; Belgium-Luxembourg 11,085.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	21,958	26,345	87	Italy 7,865; Ireland 5,120; Republic of South Africa 3,835.
Worked	40,102	40,299	258	Italy 18,131; Portugal 13,583; India 2,835.
Dolomite, chiefly refractory-grade	64,277	88,312	88	Spain 67,312; Norway 19,162; West Germany 907.
Gravel and crushed rock	311,795	571,609	7	France 239,001; Ireland 152,435; Zimbabwe 97,453.
Limestone other than dimension	2,665	2,735	--	France 2,630; West Germany 53; Denmark 21.
Quartz and quartzite	4,129	3,876	34	West Germany 907; Finland 650; Norway 518.
Sand other than metal-bearing	58,931	56,095	498	Belgium-Luxembourg 43,405; France 3,626; Ireland 3,558.
Sulfur:				
Elemental:				
Crude including native and byproduct thousand tons	1,140	899	(2)	Poland 295; Belgium-Luxembourg 224; France 218.
Colloidal, precipitated, sublimed	475	636	95	West Germany 273; France 238; Netherlands 18.
Sulfuric acid	26,959	38,476	1	West Germany 20,329; Norway 14,908; Belgium-Luxembourg 3,053.
Talc, steatite, soapstone, pyrophyllite	62,376	55,845	264	Norway 15,222; France 8,768; Netherlands 6,973.
Vermiculite	116,963	151,751	NA	NA.
Other:				
Crude	267,898	261,908	NA	NA.
Slag and dross, not metal-bearing	68,081	97,614	2	Sweden 35,567; France 34,321; Netherlands 23,763.
Oxides and hydroxides of barium, magnesium, strontium	857	1,473	33	France 700; Italy 298; West Germany 193.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	78,994	71,590	135	Belgium-Luxembourg 39,589; France 13,879; Italy 4,980.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	12,446	12,277	1,313	France 5,405; Trinidad and Tobago 3,523; Italy 1,246.
Carbon: Carbon black	68,553	65,880	--	Norway 10,322; France 8,190; unspecified 32,719.
Coal:				
Anthracite and bituminous thousand tons	7,334	4,290	1,933	Australia 1,800; Poland 142; West Germany 123.
Briquets and anthracite and bituminous coal	169,986	132,395	--	West Germany 83,503; France 31,732; Netherlands 16,507.
Lignite including briquets	3	4,509	58	West Germany 3,562; East Germany 813.
Coke and semicoke	3,349	27,924	--	Belgium-Luxembourg 19,985; France 5,426; West Germany 1,704.
Hydrogen, helium, rare gases	1,569	1,697	779	Belgium-Luxembourg 132; Poland 113; unspecified 673.
Peat including briquets and litter	151,105	135,521	--	Iceland 116,886; U.S.S.R. 13,226; Finland 2,702.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	328,262	241,149	(2)	Saudi Arabia 108,228; Norway 23,371; Kuwait 21,875.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	42,321	95,489	1	Norway 88,054; France 773; Netherlands 707.
Gasoline:				
Aviation do	27,905	21,707	NA	Netherlands 6,657; Italy 5,984; Belgium-Luxembourg 3,058.
Motor do	22,985	26,941	130	Netherlands 5,057; Norway 3,557; U.S.S.R. 3,058.
Mineral jelly and wax do	260	206	6	Netherlands 155; West Germany 16; Republic of South Africa 8.
Kerosine and jet fuel do	3,639	6,197	(2)	Netherlands 1,858; Italy 1,031; Belgium-Luxembourg 954.
Distillate fuel oil do	12,519	10,224	14	U.S.S.R. 5,139; Netherlands 2,506; Belgium-Luxembourg 827.
Lubricants do	15,109	10,581	192	Belgium-Luxembourg 3,746; Netherlands Antilles 1,532; Netherlands 1,246.
Residual fuel oil do	19,653	29,793	446	Netherlands 10,081; West Germany 4,499; France 3,615.
Bitumen and other residues do	749	376	226	Netherlands 80; Belgium-Luxembourg 30; Canada 24.
Bituminous mixtures do	32	40	4	France 24; Netherlands 5; Canada 3.
Petroleum coke do	2,010	1,687	1,023	Netherlands 323; Belgium-Luxembourg 184; Norway 101.
Tars and other crude chemicals derived from coal, gas, and petroleum	549,983	477,436	301,045	France 53,300; Netherlands 53,196; Belgium-Luxembourg 21,137.

r Revised. NA Not available.
[1]Excludes unreported quantity valued at $2,945,090 in 1980 and $1,314,079 in 1981.
[2]Less than 1/2 unit.
[3]Excludes quantity valued at $39,461,026 in 1980 and $46,045,497 in 1981.
[4]Imports in 1980 were 4,401 tons.

COMMODITY REVIEW

METALS

Aluminum.—Output of aluminum by Anglesey Aluminum Ltd. at Holyhead, North Wales, jointly owned by the Kaiser Aluminum and Chemical Corp. (67%) and Rio Tinto Zinc Corp. (33%), was 99,000 tons in 1981, and in 1982 output was about 85,000 tons. The smelter had a capacity of 112,000 tons per year of aluminum metal, which was not reached because of the depressed economic conditions. The plant had two potlines with a total of 308 pots, each pot capable of processing about 650 tons per year of alumina. Most of the alumina used in-plant was supplied from Jamaica, Australia, and Suriname.

Up to 230 megawatts of electrical power was supplied to the plant from the United Kingdom National Grid Network via a connection at the nearby Wylfa Head nuclear power station. A contract, under the terms of which Alcan Aluminum (United Kingdom) Ltd. received 20,000 tons per year of primary aluminum from Anglesey, was ended by Kaiser after 12 years because the price was too low; the decision was not expected to affect production at the Anglesey smelter. Anglesey reported a pretax profit of $6.4 million in 1981, down from $8.7 million in 1980.

The British Aluminum Co. Ltd. (BACO) closed its 100,000-ton-per-year Invergordon smelter near Inverness at the beginning of 1982 because of high power costs. Besides four aluminum rolling mills, the company continued to operate an alumina plant at Burntisland and two aluminum smelters: one at Lochaber with a capacity of 37,000 tons per year and one at Kinlochleven with a capacity of 100,000 tons per year. Most of the alumina used in the Lochaber and Kinlochleven plants was supplied from Jamaica.

BACO managed a small trading profit of $1.3 million in the first 6 months of 1982,

but the high level of interest charges kept the company overall in the red, with a loss before tax of $6.1 million compared with a loss of $14.4 million reported in the same period in 1981.

Alcan Lynemouth Ltd., which owned and operated an aluminum smelter about 13 kilometers north of the Port of Blyth, was a wholly owned subsidiary of Alcan United Kingdom. In 1981, the plant produced, at full capacity, about 125,000 tons of aluminum per year, but in 1982 it operated at only about 85% of capacity because of the depressed market conditions. Alumina was supplied from Jamaica, but supplies were expected in the future from the Aughinish alumina plant, which was under construction in Ireland. The National Coal Board's (NCB) nearby Lynemouth-Ellington Mine supplied coal on a long-term contract to Alcan's own 390-megawatt power station, located less than 1-kilometer from the smelter.

In December, BACO and Alcan United Kingdom announced a merger of the two companies. Alcan made a cash offer of nearly $50 million to BACO for all of its ordinary and cumulative preference shares, which was accepted by the directors of BACO. Tube Investments Ltd., which currently owned 58.1% of BACO, agreed to accept this offer. The merger of the two companies could provide a viable and competitive United Kingdom aluminum operation in the long term. The new company would be called British Alcan Aluminum.

Iron and Steel.—BSC's operating loss in the 6-month period ending October 2, 1982, was $253 million after interest payments, better than the $341 million lost in the same period of 1981 but far below the target of breaking even over the business year of 1982-83.

BSC's losses in the financial year ending March 31, 1982, were about one-half of the 1980-81 deficit of $1,096 million. United Kingdom's output of steel for the first 10 months of 1982 averaged 276,500 tons per week, 5.6% below the 292,800 tons per week of the same period in 1981. The worst effects of the lower production were felt by BSC plants in the Teesside and Sheffield areas. British producers were hit by the higher level of imports, particularly from countries outside the European Economic Community (EEC). Non-EEC imports more than doubled from 1981 levels reaching at least 27% of the market, and came mainly from Sweden, Romania, the Republic of South Africa, Canada, and Japan. From mid-1981 to mid-1982 the British steel industry saw jobs cut by 11.7%, more than any of the other major EEC steelmakers.

In December, the British Government confirmed that all five of BSC's main steelmaking plants, Teesside and Scunthorpe in the north of England, Ravenscraig in Scotland, and Llanwern and Port Talbot in Wales, will be kept open for the next 3 years despite expected losses of about $13.6 million per week. Following the announcement, the BSC Chairman, Ian MacGregor, said the decisions will put great strains on the firm and that another 7,000 to 10,000 layoffs will occur. The decision to save the plants did not commit BSC to keep steel capacity at the level of 14.4 million tons.

Nickel.—The refinery at Clydach, Wales, of Inco Europe Ltd., a subsidiary of Inco Ltd. of Canada, has not produced nickel pellets or powder since May 1982 because of lack of demand. This was the biggest nickel metal production plant in Europe, with a capacity of about 54,500 tons per year. The plant produced charge nickel for the steel industry, nickel for the production of nonferrous alloys, and nickel for electroplating. A nickel oxide-matte came from Inco's operations in Canada and nickel sulfide matte came from Indonesia.

Tin.—Reported in situ reserves at South Crofty and Pendarves were 943,373 tons of 0.8% tin. Total annual output from South Crofty in the year ending March 1982 was a little over 260,000 tons of ore, and production of tin was 1,380 tons.

Underground lode mines at South Crofty and Pendarves continued to be the largest British tin producers, owned by Charter Consolidated Ltd. and RTZ Ltd. on a 60:40 basis. South Crofty was located at Pool, between the towns of Redruth and Camborne; it consisted of a group of 12 old mines, including the following: Rockear, Dolocath, Cook's Kitchen, South Crofty, Tincroft, East Pool, Wheal Agar, and Great South Tolgus. Pendarves was a small mine with 80 employees to the southwest of Camborne.

Tin minerals occurred in the South Crofty Mines, mainly in an east-northeast striking series of veins in medium-grained granite. The distribution of cassiterite, within all bodies, was very irregular. Working levels were up to 680 and 730 meters underground (Robinson's and New Cook's Kitchen Mines). A total of 588 persons were em-

ployed in 1982 by the South Crofty and Pendarves Mines including all surface facilities and staff. Tin concentrates were shipped to the Capper Pass smelter in North Ferriby, a wholly owned subsidiary of RTZ.

Capper Pass Ltd. was investing in a modernization program at the works; this included a new electric-arc furnace and a fluidized-bed, coal-fired boiler, together with a number of environmental control plants.

At the Wheal Jane Mine, also in Cornwall, under a new contract Thyssen, Great Britain Ltd. deepened the Clemows shaft to 510 meters; installed a new underground crusher station, loading pockets, and ore passes; equipped the shaft extention; and carried out some development drivage. The principal levels were at depths of 168 and 288 meters. A new level was also opened at a depth of 468 meters. The mine produced 276,000 tons of tin ore and 1,500 tons of tin concentrates in 1981, including both high-grade (35% tin) and low-grade (9% tin) concentrates. In addition, a zinc concentrate (45% zinc) was produced that accounted for 25% of the total annual revenue of approximately $16.4 million. Production of ore restarted in June 1980 following the purchase and refurbishing of the mine and mill by Carnon Consolidated Tin Mines Ltd., a wholly owned subsidiary of RTZ.

At the Geevor Tin Mines Ltd.'s underground lode mines at Pendeen, production of tin ore was 134,233 tons in 1981-82. In situ reserves of tin ore as of January 1, 1982, were estimated to be 940,716 tons containing 0.89% tin. In addition to ore mined from underground, the Geevor mill treated material reclaimed from old dumps estimated at 60,150 tons. Total production of concentrates during 1981-82 was 1,295 tons, an average of 65% tin grade. The weakness in the world tin market hit Geevor in the 6-month period ending September 30, 1982, and the average price the veteran Cornish producer received for its tin was $11,247 per ton, down from $11,468 in the comparable period of 1981.

Wheal Concorde, a small underground tin operation at Blackwater, north of Redruth, Cornwall, was to close temporarily with the loss of 40 jobs. According to a local report, the mine was to remain on a care and maintenance basis while the company seeks further capital to construct its own mill at the mine.

Since opening 18 months ago, the mine had produced 21,000 tons of ore that was treated on a custom-mill basis by Carnon Consolidated at its Wheal Jane operation. However, this was not commercially successful.

Titanium.—A new $41 million titanium granule plant was opened at Deeside, by Deeside Titanium Ltd. The plant had a capacity of 5,000 tons per year of titanium and was the only European producer of titanium granules, after an existing Imperial Chemical Industries Ltd. (ICI) smelter facility closed down at the end of 1982. Deeside Titanium is a joint venture of Billiton (United Kingdom) Ltd. (62.5%), Rolls Royce Ltd. (20%), and Imperial Metal Industries (17.5%).

The present United Kingdom titanium sponge capacity of about 2,700 tons per year was also expected to increase to about 5,000 tons per year in 1982.

Tungsten.—Amax Exploration of the United Kingdom on October 16, 1981, applied for planning permission to opencast the Hemerdon tungsten deposit near Plymouth. A public enquiry, which opened in Plymouth in September 1982, was expected to last 6 weeks, and results were expected sometime during the first quarter of 1983. The deposit could only be economically worked by open pit. Reserves were reported to be 45 million tons carrying 0.18% WO_3 and 0.025% tin.

NONMETALS

Barite.—One of the largest barite operations in the United Kingdom was the Closehouse Mine at Lunedale in County Durham, which had a processing plant at Stockton-on-Tees. This was purchased by Fordamin Co. Ltd., a subsidiary of English China Clays Ltd. (ECC), from Athole G. Allen Ltd. in 1981. In 1982, production of barite at Lunedale was estimated at about 10,000 tons.

The Sanbar Minerals Co. Ltd.'s plant at Dufton Fell in Cumbria came onstream in May 1982 with an initial production capacity of 10,000 to 12,000 tons per year of barite. The feed material, containing 50% to 85% $BaSO_4$, was obtained from extensive high-grade dumps near the plant.

Operational and financial difficulties at the SPO Minerals Ltd. plant at Brassington, in Derbyshire, continued in 1982 and the company intended to sell the plant. The plant was planned to treat barite-lead-fluorspar ores from a number of locations, including dumps, producing 33,600 tons per year of barite. Dresser Industries Inc. was

involved in exploring and investigating a possible barite mining operation near Aberfeldy, Tayside, Scotland.

China Clays.—ECC was the largest producer of china clay in the world, with a capacity of about 3 million tons per year. The company had producing subsidiaries in the United States, France, Australia, Belgium, Sweden, and Italy.

The Cornwall-based group ECC reported that its clay division had commissioned a new processing plant enabling less efficient units to be closed. In October 1982, a new distribution depot was opened at Cliff Vale, Stoke-on-Trent. The depot provided a direct rail link from the center of china clay production in St. Austell, Cornwall, to the center of the country's pottery industry in Stoke-on-Trent, Staffordshire. In the initial phase the rail link will carry up to 150,000 tons of clay per year to the new 6,000-ton-capacity depot.

Fluorspar.—Owing to the recession, the plant of Laporte Industries Ltd. was operating at only 50% of capacity. The company continued to be the United Kingdom's largest fluorspar-producing company with 150,000 tons per year capacity at its Cavendish mill near Stoney Middleton in Derbyshire.

Aberdeen Barytes Co. Ltd. (Dresser Minerals) was the other major producer of fluorspar. In 1982, the company was working only one mining operation at Conksbury Lane, near Youlgreave, where the grade of fluorspar ranged from 20% to 35% CaF_2. The plant, located at Ryder Point near Wirksworth with a capacity of 80,000 tons per year, was virtually shut down owing to the recession.

BSC, which had three mines, operated only the Whiteheaps Mine at Blanchland in Durham County. Two others were held on a care and maintenance basis. The briquetting plant at Blackdene had a capacity of 50,000 tons per year of 90% CaF_2 as briquettes, but owing to decreased demand, it was producing at a reduced rate.

Potash.—The Boulby Mine, owned by Cleveland Potash Ltd. and located in northeast England between the villages of Loftus and Staithes on the North Sea coast, was shut down for 3 weeks in January 1982, owing to the depressed market and imports of potash from the German Democratic Republic.

In the 1981-82 year ending June 30, production of potash decreased by 40,000 tons compared with that of 1980-81, and totaled 277,000 tons. This year marked a very large expansion in domestic sales of home-produced potash. The share of domestic potash sales to total sales increased from 57% in 1980-81 to 82% in 1981-82. Domestic sales in 1981-82 totaled about 207,000 tons of potash and export sales amounted to 45,000 tons.

MINERAL FUELS

The United Kingdom was self-sufficient, overall, in energy requirements, largely as a result of continuing increases in North Sea oil production. In 1982, total primary energy consumption from fossil fuels and hydroelectric and nuclear generation in the United Kingdom was 311 million tons of SCE including coal, 111 million tons; petroleum, also 111 million tons; gas, 71 million tons; nuclear energy, 16 million tons; and hydroelectric energy, 2.3 million tons.

In 1982, the United Kingdom used 1.8% less energy compared with that of 1981. A significant proportion of the decline was due to the continued economic recession. Energy use dropped most sharply in the fourth quarter of 1982, when consumption of primary fuels dropped by 5.1% to 85.3 million tons of SCE.

Coal.—In 1982, there were 197 operational mines, with 209,927 employees. Between March 1974 and June 1982 the employment decreased by 37,455 employees. Among the mines, 63 opencast mines were in production, operated by about 20 different contractors. During 1981-82, 12 sites completed their coal operations and 13 new ones were commissioned.

The importance of opencast coal production was shown by total sales during 1981-82 of $900 million, compared with $6,100 million for deep mined coal. Opencast mines yielded an operating profit of $257 million; in contrast, underground mines recorded a loss of $436 million.

The United Kingdom's recoverable reserves of coal were estimated by the NCB as 15% of the Organization for Economic Cooperation and Development reserves, or 7% of the world total. Offshore exploration by the NCB from 1979-82 included drilling of 126 boreholes totaling approximately 43,000 meters, of which 75% were cored.

Under the Coal Plan (1974), which was recently reaffirmed by the Government, large investments to improve productivity were undertaken as follows, in million

dollars:

	1980-81	1981-82
Capital investments	1,328	1,343
Government subsidy	417	943
Operating grants	287	746
Social grants	130	197

Falling demand, resulting from the economic recession together with resistance from the industry work force to the closure of less efficient mines, required the Government's continued and even increased involvement.

In 1982, the Selby mining complex in North Yorkshire represented one of the most important new underground coal projects in the United Kingdom. The total cost was estimated at $1.6 billion. Five pairs of shafts were being sunk across the 285-square-kilometer coalfield, of which three were completed in 1982.

A 12-year contract was awarded by the NCB for the operation of a new opencast coal site at East Chevington, Northumberland. The contract, awarded to Derek Crouch (contractors), involved the extraction of 3.5 million tons of coal from a 260-hectare site over 10 years.

Coal reserves at the Kinneil colliery in Scotland were found to be unworkable and the mine was to close.

Natural Gas.—Preliminary figures for 1982 showed that 108 billion cubic feet of natural gas was supplied into the public supply system, 2.0% less than in 1981. The British Gas Corp. (BGC) made a promising North Sea gas discovery about 30 miles from the Humber estuary in the southern part of the sea in block 47-9B. The corporation, as operator of an international drilling consortium, said that it tested good-quality natural gas at attractive flow rates. The discovery was the fourth find made by BGC since the beginning of 1981. Three of the potentially commercial discoveries were gas, while the fourth was an oil find onshore. BGC was told by the Government that it must concentrate on gas exploration and production and the Energy Minister stated that any oil discovered was likely to be sold, either to the public or to other oil companies. Participating in the 47-9B discovery were BGC (73-1/3%), Amerada Petroleum Inc. (16-2/3%), and Texas Eastern North Sea (United Kingdom) Ltd. (10%). Further north, North Sea oil companies were expected to develop three new gasfields at a cost of over $1.6 billion as a result of supply contracts negotiated with BGC.

In the Oil and Gas (Enterprise) Act of 1982, the special privileges enjoyed by BGC in the purchase of natural gas were removed, enabling private companies to sell gas direct to large consumers. The Government has encouraged the search for new gasfields by the inclusion of part of the established gas province in the southern North Sea in the areas on offer under the Eighth Licensing Round.

The Far North Liquid and Associated Gas System pipeline, which will bring associated gas from the Brent Oilfield to St. Fergus in Scotland, was commissioned after the investment of $1.64 billion, and first gas deliveries to BGC commenced in June 1982. This pipeline will also collect associated gas from other North Sea oilfields in the future. From St. Fergus another pipeline was under construction linking the terminal to central Scotland and northern England where it was to link up with the existing gas transmission system.

Petroleum.—Production of crude oil reached 2.3 million barrels per day, which was in excess of the United Kingdom's own requirement. It could not be guaranteed that the production rate would continue at that level, however, especially in the 1990's. Some of the larger fields that have been in production for some time have reached their maximum output and some were beginning to decline. During the year, the United Kingdom had 20 producing fields offshore. Total crude oil output amounted to 753 million barrels, an increase of 15.7% over that of 1981.

The Beatrice Field, which came onstream in September 1981, was officially inaugurated in June, a few days after British Petroleum Ltd. agreed to sell its 15% share in the British National Oil Corp. (BNOC) operated group to The Lasmo Co. Lasmo paid about $123 million, backdated to January 1, 1982.

First oil from Shell Ltd. and Esso (United Kingdom) Ltd.'s North Cormorant and Fulmar Fields was produced in February. North Cormorant, which produced an average of 34,200 barrels per day in August, will have a peak production level of 180,000 barrels per day by 1986. Fulmar had a similar peak production level set for 1985.

Marathon Ltd.'s South Brae Field production was expected to start in mid-1983. Reserves were estimated at 300 million barrels.

Marathon is expected to complete its appraisal of the Brae B structure in the fall of 1982. Hamilton Bros. confirmed a discovery, Duncan, 4 miles west of their Argyll Field, following a 90-day production test.

BNOC split its operations into Britoil Ltd. (exploration and production) and a reconstituted BNOC (oil trading activities). The sale of 51% of Britoil to the public would raise about $1,000 million to $1,200 million for the Treasury.

The Government decided not to impose depletion control on United Kingdom oil production, at least until yearend 1984, in a move welcomed by oil companies. The British Government was preparing the way for new tax rules to cover marginal fields in the North Sea, but changes were still under study in the Treasury Department.

The Energy Department approved a $1.6 billion project for development of Clyde Field in the North Sea by Britoil, in partnership with the Shell-Esso group.

Private companies were not interested in many of the oil exploration areas offered by the Government and concentrated their bids on possible gas producing concessions off Yorkshire and Lincolnshire. This became apparent when the Energy Department announced that the number of applications in the eighth round of licensing was well below the previous round; only 60 applications were received for the 184 blocks on offer. Companies also were more interested in gas exploration because under recent legislation they would be allowed to market the fuel themselves. In the past, BGC had the monopoly right to buy North Sea gas.

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[1]Foreign mineral specialist, Division of Foreign Data.

[2]Where necessary, values have been converted from pounds sterling (£) to U.S. dollars at the rate of £1.00=US$1.64, the average rate during 1982.

[3]United Kingdom Mineral Statistics (London). 1982, p. 3.

The Mineral Industry of Venezuela

By H. Robert Ensminger[1]

The Venezuelan economy showed a decline of about 1.5% relative to that of 1981. The gross domestic product decreased from $67.68 billion in 1981 to an estimated $67.58 billion[2] at current prices.

The Government fight against inflation has been modestly successful, reducing the 1981 rate of 11% to 10.5% in 1982, which was much below the 19.6% rate of 1980.

The volume of exported petroleum and refinery products, as well as their value, decreased in 1982 relative to that of 1981. Declining revenues from petroleum exports and persistent capital outflow forced the Government to implement strict austerity measures in 1982.

The expenditures for development of the Orinoco heavy oil belt in the Sixth National Plan (1981-85) originally were to have been $37 billion. Owing to reduced oil revenues, this planned investment was lowered to about $21 billion in 1982. A further reduction, to about $16 billion, is likely in 1983.

At yearend, Corporación Venezolana de Guayana (CVG), the industrial development corporation for the State of Guayana, was seriously considering the sale of its share in several iron, steel, and aluminum companies to Fondo de Inversiones (FIV), the National Government investment fund. CVG has minority shares in the FIV-dominated iron company C.V.G. Ferrominera Orinoco C.A., the steel company Siderúrgica del Orinoco C.A. (SIDOR), the alumina company Interamericana de Alumina C.A. (INTERALUMINA), and the aluminum firms Industria Venezolana de Aluminio C.A. (VENALUM) and Aluminio del Caroni S.A. (ALCASA). CVG will very likely transfer its majority shares in the bauxite company C.V.G. Bauxita Venezolana C.A. (BAUXIVEN) to FIV in 1983.

PRODUCTION

Petroleum continued as the backbone of Venezuela's mineral production, but production declined by about 10% compared with that of 1981.

Aluminum production fell by an estimated 17% or about 54,000 tons from that of 1981. VENALUM's production was off approximately 26% to about 150,000 tons while ALCASA's production declined about 15% to 94,000 tons.

Raw steel production for 1982 reached a record 2.3 million tons, an increase of approximately 6% over that of 1981. Venezuela produced an estimated 2.4 million tons of pig iron in 1982.

Production of iron ore and concentrate fell to an estimated 12 million tons from 15.5 million tons in 1981.

Gold production for 1982 was estimated to be about 28,000 troy ounces.

Table 1.—Venezuela: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
METALS					
Aluminum, unalloyed ingot	74,384	227,444	327,900	313,523	e260,000
Gold, mine output, metal content—troy ounces	13,384	14,989	13,841	18,326	27,632
Iron and steel:					
Iron ore and concentrate—thousand tons	13,515	15,260	16,103	15,553	11,701
Metal:					
Pig iron[2]—do	693	1,331	2,367	2,230	2,357
Ferroalloys:					
Ferromanganese—do	--	1	e2	e2	e2
Ferrosilicomanganese—do	--	1	e2	e2	e2
Ferrosilicon—do	e28	35	47	e22	e47
Total—do	e28	37	51	e26	e51
Steel ingots and castings—do	860	1,474	1,784	1,817	2,296
Semimanufactures, hot-rolled—do	1,081	1,224	1,398	1,400	1,795
Lead, secondary, smelter[e]	8,000	10,000	10,000	10,000	10,000
NONMETALS					
Cement, hydraulic—thousand tons	3,426	3,979	4,843	e4,900	5,594
Clays:[3]					
Kaolin	23,057	21,528	e22,000	65,642	e65,000
Other—thousand tons	3,342	2,088	e2,000	2,629	e2,600
Diamond:					
Gem—carats	269,398	236,606	210,520	e97,000	92,763
Industrial—do	486,471	566,040	455,336	e403,000	342,566
Total—do	755,869	802,646	665,856	e500,000	435,329
Feldspar	70,262	88,902	6,065	21,684	e7,000
Gypsum	187,142	260,141	117,476	218,234	159,000
Lime, hydrated	--	--	--	1,888	e1,900
Nitrogen: N content of ammonia—thousand tons	271	259	361	415	440
Salt, all types	158,000	e155,000	243,145	e250,000	340,166
Stone, sand and gravel:[3]					
Stone:					
Broken stone and dust, not further described—thousand tons	1,694	1,459	e1,500	7,962	e7,900
Dolomite	84,662	NA	NA	254,540	182,000
Granite	--	367	208	1,256	e1,200
Limestone—thousand tons	32,736	19,872	19,074	31,690	5,760
Marble—cubic meters	139	191	e200	292	4,089
Sand and gravel—thousand tons	21,667	19,231	12,248	9,946	13,105
Sand—do	--	--	--	9,442	e9,500
Sand, glass—do	--	--	--	442	e500
Sulfur, byproduct of petroleum and natural gas	95,000	85,201	e85,000	e85,000	e84,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon: Carbon black[e]—thousand tons	31	16	23	19	18
Coal, bituminous	80,643	55,377	39,421	45,735	43,100
Gas, natural:					
Gross—million cubic feet	1,230,428	1,304,624	1,251,864	1,224,586	1,163,973
Marketable—do	520,171	575,556	589,046	584,349	e527,000
Natural gas liquids:[4]					
Condensate—thousand 42-gallon barrels	98	75	101	52	30
Natural gasoline—do	5,320	6,120	5,472	5,177	5,642
Liquefied petroleum gas—do	16,995	18,995	16,448	14,889	15,511
Total—do	22,413	25,190	22,021	20,118	21,183
Petroleum and refinery products:					
Crude[5]—do	790,420	860,072	793,397	767,552	691,689
Refinery products:					
Gasoline:					
Aviation—do	200	271	276	284	328
Motor—do	51,810	54,102	57,557	59,578	62,694
Jet fuel—do	11,187	10,970	11,699	11,369	14,362
Kerosine—do	3,965	3,699	4,352	5,266	3,675
Distillate fuel oil—do	51,555	56,484	63,688	61,890	62,745
Residual fuel oil—do	206,335	202,306	168,906	147,117	140,052
Lubricants—do	2,873	3,163	3,277	2,741	2,481
Liquefied petroleum gas—do	2,424	2,241	2,537	1,765	1,955
Asphalt and bitumen—do	5,544	7,798	7,634	10,082	9,313
Naphtha—do	17,320	16,906	12,752	8,534	10,140
Refinery gas[6]—do	6,534	6,692	6,497	8,518	8,578

See footnotes at end of table.

Table 1.—Venezuela: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Unspecified thousand 42-gallon barrels	2,146	3,938	2,292	1,870	1,479
Total do	361,893	368,570	341,467	319,014	317,802

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through July 1, 1983.
[2]Total includes sponge iron.
[3]Data prior to 1981 were based on figures taken from the Memoria y Cuenta published annually by the Ministerio de Energia y Minas. Some of this information is not compatible with 1981 figures but will be adjusted when more reliable data become available.
[4]From nonassociated natural gas only.
[5]Includes associated natural gas lease condensate and natural gasoline. Lease condensate is included as follows, in thousand 42-gallon barrels: 1978—1,048; 1979—1,803; 1980—1,227; 1981—1,661; and 1982—1,771. Natural gasoline is included as follows, in thousand 42-gallon barrels: 1978—329; 1979—255; 1980—308; 1981—307; and 1982—293.
[6]Liquid equivalent.

TRADE

Petroleos de Venezuela S.A. (PDVSA) reported the value of exported crude petroleum and refined petroleum products dropped from $19 billion in 1981 to $15.6 billion in 1982. In 1982, 567 million barrels of crude petroleum was exported, of which 55% was heavy oil, less than 22° API gravity. In 1982, Venezuela exported approximately 51 million barrels of crude oil to the United States, which comprised about 10% of total crude oil exports and 3% of U.S. imports.

Export share of crude oil by each PDVSA subsidiary company was as follows: Lagoven S.A., 41%; Maraven S.A., 29%; Meneven S.A., 16%; and Corpoven S.A., 14%.

Iron ore exports for 1982 were off about 30% from those of 1981, which in turn had shown a 5% increase over those of 1980. Much of the decline resulted from the cancellation of a 1.4-million-ton-per-year contract by the Bethlehem Steel Corp. Venezuela exported an estimated 3.6 million tons of iron ore to the United States in 1982, which was about 24% of total U.S. imports.

Venezuela concluded a broad-ranging steel trade agreement with Brazil, Mexico, and Argentina. The agreement allows Venezuela to export surplus steel production to these countries and import steel products on preferential terms. The agreement is to take effect in 1983.

Table 2.—Venezuela: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	1,144	720	--	Spain 593; Japan 126.
Unwrought	209,068	233,945	15,340	Japan 189,907; Netherlands 8,202; Colombia 7,130.
Semimanufactures	37,236	24,442	14,723	India 6,031; Japan 1,977; Mexico 1,607.
Copper: Metal including alloys:				
Scrap	513	896	210	Belgium-Luxembourg 686.
Semimanufactures	76	723	370	Belgium-Luxembourg 170; United Kingdom 70; West Germany 65.
Iron and steel:				
Iron ore and concentrate thousand tons	11,752	NA		
Metal:				
Scrap	324	NA		
Pig iron, cast iron, related materials	188,462	301,781	217,770	Yugoslavia 25,106; West Germany 22,968; Netherlands 16,541.

See footnotes at end of table.

Table 2.—Venezuela: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys	21,879	2,484	2,484	
Steel, primary forms	997	48,845	17,838	Japan 11,700; United Kingdom 2,766.
Semimanufactures:				
Bars, rods, angles, shapes, sections	44,295	6,399	--	All to Thailand.
Universals, plates, sheets	154,502	39,023	23,028	Mexico 7,836; West Germany 6,845; Colombia 1,314.
Hoop and strip	39	306,386	35,241	Japan 80,405; Italy 71,520; Brazil 31,681.
Rails and accessories	--	1,009	--	Japan 997; Argentina 12.
Tubes, pipes, fittings	531	64,408	53,712	Canada 6,880; Bolivia 2,030.
Castings and forgings, rough	NA	3	--	Netherlands Antilles 2; Colombia 1.
Lead:				
Oxides	9	NA		
Metal including alloys:				
Scrap	10	2,100	--	All to Brazil.
Semimanufactures	4	NA		
Metalloids	18	NA		
Nickel: Metal including alloys, semimanufactures				
value, thousands	$1	$1	--	All to Netherlands Antilles.
Silver: Waste and sweepings ---do---	$44	$114	$114	
Zinc: Oxides	245	237	--	Guatemala 69; Jamaica 57; Costa Rica 48.
Other: Base metals including alloys, all forms	4,470	NA		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	3	2	--	All to Netherlands Antilles.
Grinding and polishing wheels and stones	23	28	--	Trinidad and Tobago 19; Mexico 9.
Boron materials: Crude natural borates	2	5	--	All to Colombia.
Cement	425	42	--	All to Netherlands Antilles.
Clays and clay products:				
Crude	1	3	--	All to Netherlands.
Products:				
Nonrefractory	73	295	--	Netherlands Antilles 271; Trinidad and Tobago 21; Colombia 2.
Refractory including nonclay brick	51	NA		
Diamond:				
Gem, not set or strung				
value, thousands	$5,100	$235	--	All to Belgium-Luxembourg.
Industrial ---do---	$17,649	$9,963	$4,735	Belgium-Luxembourg $5,228.
Fertilizer materials: Manufactured, nitrogenous	145,247	226,105	8,668	Colombia 75,696; Brazil 56,508.
Gypsum and plaster	7,650	10,154	--	Trinidad and Tobago 10,150; Netherlands Antilles 4.
Precious and semiprecious stones other than diamond: Natural				
value, thousands	$868	$2,843	$1,069	Belgium-Luxembourg $1,774.
Sodium and potassium compounds, n.e.s.:				
Sodium hydroxide	5	2	--	All to Netherlands Antilles.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	133	9	--	Do.
Worked	147	101	--	Do.
Gravel and crushed rock	634	1,137	--	Netherlands Antilles 934; Trinidad and Tobago 202.
Sand other than metal-bearing	605	510	--	All to Colombia.
Sulfur: Elemental: Crude including native and byproduct	8,645	NA		
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	2,488	5,256	2,168	Netherlands Antilles 2,639; Colombia 401; Chile 48.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	NA	2,785	--	Trinidad and Tobago 1,233; Jamaica 855; Ecuador 573.
Hydrogen, helium, rare gases	8	22	--	All to Netherlands Antilles.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	469,828	NA		
Refinery products ---do---	200,714	NA		

NA Not available.

Table 3.—Venezuela: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	236	176	42	Belgium-Luxembourg 66; United Kingdom 50; West Germany 18.
Aluminum:				
Ore and concentrate	34,290	32,695	5,876	Guyana 26,819.
Oxides and hydroxides	503,846	696,667	122,296	Guyana 265,543; Jamaica 162,985; Australia 31,463.
Metal including alloys:				
Scrap	--	1	1	
Unwrought	97	467	288	Belgium-Luxembourg 103; United Kingdom 74.
Semimanufactures	26,159	24,726	18,364	Japan 2,388; France 1,124.
Chromium:				
Ore and concentrate	4,951	1,954	1	Republic of South Africa 1,953.
Oxides and hydroxides	319	272	119	West Germany 104; Netherlands 36; Spain 2.
Cobalt: Oxides and hydroxides	10	11	5	United Kingdom 4; Japan 2.
Copper:				
Ore and concentrate	72	NA		
Metal including alloys:				
Unwrought	4,046	3,632	1,497	Peru 1,844; Chile 274.
Semimanufactures	r26,159	22,142	9,842	Chile 4,455; West Germany 1,422; Sweden 714.
Iron and steel:				
Iron ore and concentrate	1	2	2	
Metal:				
Scrap	32,473	50,328	34,332	Brazil 14,998; Netherlands Antilles 992; West Germany 3.
Pig iron, cast iron, related materials	2,782	67	10	West Germany 57.
Ferroalloys:				
Ferromanganese	35,333	16,497	40	Brazil 10,528; Republic of South Africa 5,757.
Unspecified	8,787	4,272	352	Republic of South Africa 3,196; Brazil 564; West Germany 67.
Steel, primary forms	567,447	210,730	21,549	Japan 79,143; Belgium-Luxembourg 31,209; West Germany 24,508.
Semimanufactures:				
Bars, rods, angles, shapes, sections	243,327	137,263	8,788	West Germany 31,752; Japan 29,898; Belgium-Luxembourg 24,431.
Universals, plates, sheets	336,858	268,500	16,823	Japan 125,523; West Germany 26,684; Belgium-Luxembourg 23,735.
Hoop and strip	7,396	4,614	1,174	West Germany 1,114; Japan 931; Italy 646.
Rails and accessories	5,223	14,040	3,010	Spain 5,139; France 2,830; Belgium-Luxembourg 1,598.
Wire	5,314	5,557	1,129	United Kingdom 1,411; Brazil 1,229; West Germany 560.
Tubes, pipes, fittings	128,018	262,903	35,618	Japan 124,980; West Germany 27,071; Argentina 25,228.
Castings and forgings, rough	1,539	1,583	246	Italy 925; Netherlands 126; Japan 123.
Lead:				
Oxides	1,950	1,182	213	Peru 352; Mexico 283; West Germany 255.
Metal including alloys:				
Scrap	3,225	404	81	Guatemala 170; Netherlands Antilles 78; Dominican Republic 75.
Unwrought	5,006	6,697	85	Peru 6,200; Denmark 295; Switzerland 50.
Semimanufactures	1,928	3,983	124	Peru 3,000; West Germany 632; Mexico 190.
Magnesium: Metal including alloys:				
Scrap	159	NA		
Unwrought	717	618	129	Norway 225; Belgium-Luxembourg 152; West Germany 101.
Semimanufactures	92	61	57	Colombia 4.
Manganese:				
Ore and concentrate	5,552	23,386	--	Brazil 11,320; Jamaica 6,000; Mexico 6,000.
Oxides	1,797	2,135	1,180	Mexico 894; West Germany 36; Brazil 15.
Mercury 76-pound flasks	232	116	29	Belgium-Luxembourg 29; West Germany 29; Mexico 29.
Metalloids:				
Arsenic: Oxides and hydroxides	17	2	--	Mainly from West Germany.
Unspecified	234	278	144	West Germany 82; Canada 30; Republic of South Africa 18.

See footnotes at end of table.

Table 3.—Venezuela: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Molybdenum: Metal including alloys, all forms	3	31	31	
Nickel:				
Ore and concentrate	14	490	--	Australia 488; Mexico 2.
Matte and speiss	6	109	99	Canada 10.
Metal including alloys:				
Scrap	1	NA		
Unwrought	185	207	120	West Germany 67; Finland 13; Netherlands 5.
Semimanufactures	368	505	221	Japan 107; West Germany 85; United Kingdom 52.
Platinum-group metals: Metal including alloys, unwrought and partly wrought value, thousands	$80	$18	$12	West Germany $4; Italy $2.
Silver:				
Waste and sweepings[1] do	$56	$26	--	All from United Kingdom.
Metal including alloys, unwrought and partly wrought do	$3,695	$1,139	$540	Spain $242; France $146; West Germany $81.
Tin:				
Oxides	7	20	--	All from West Germany.
Metal including alloys:				
Unwrought	187	262	188	Peru 21; Switzerland 15; Hong Kong 7.
Semimanufactures	148	109	45	Peru 47; United Kingdom 10; France 3.
Titanium: Oxides	2,665	2,598	132	Finland 934; Italy 493; United Kingdom 234.
Tungsten: Metal including alloys, all forms	24	23	22	NA.
Uranium and/or thorium: Metal including alloys, all forms value, thousands	$29	NA		
Zinc:				
Ore and concentrate	1	111	111	
Oxides	131	121	31	Peru 31; West Germany 15; Netherlands 14.
Blue powder	940	451	211	Norway 83; West Germany 81; Canada 60.
Metal including alloys:				
Scrap	2	NA		
Unwrought	25,515	18,669	1,334	Canada 9,318; Peru 6,448; Belgium-Luxembourg 1,056.
Semimanufactures	146	109	41	Peru 63; Netherlands 3; Italy 1.
Other:				
Ores and concentrates	972	2,382	295	Republic of South Africa 2,013; Australia 72; West Germany 1.
Pyrophoric alloys	2	NA		
Base metals including alloys, all forms	382	360	192	United Kingdom 53; West Germany 26; Belgium-Luxembourg 23.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	277	237	51	Italy 78; West Germany 44; France 40.
Artificial: Corundum	1,817	1,139	204	Brazil 427; West Germany 229; Austria 225.
Dust and powder of precious and semi-precious stones value, thousands	$12	$8	$8	
Grinding and polishing wheels and stones	281	447	64	Italy 205; Japan 89; West Germany 62.
Asbestos, crude	9,111	11,742	643	Canada 10,670; West Germany 368; Spain 20.
Barite and witherite	141,349	158,863	--	NA.
Boron materials:				
Crude natural borates	474	1,338	819	Canada 358; Colombia 81; Netherlands 51.
Oxides and acids	316	624	564	Chile 50; West Germany 8; United Kingdom 1.
Cement thousand tons	800	1,167	69	Spain 314; Colombia 166; Sweden 122.
Chalk	735	2,199	18	Colombia 2,127; France 40; West Germany 9.
Clays and clay products:				
Crude	67,504	67,558	57,720	Republic of South Africa 4,988; Guatemala 2,750; Colombia 1,095.

See footnotes at end of table.

Table 3.—Venezuela: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products —Continued				
Products:				
Nonrefractory	42,127	55,638	963	Colombia 21,977; Spain 13,002; Italy 12,989.
Refractory including nonclay brick	88,484	48,954	15,335	West Germany 16,474; Austria 10,298; Spain 3,579.
Cryolite and chiolite	15	6	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$91	$158	$35	Belgium-Luxembourg $123.
Industrial do.	$126	$81	$65	Israel $13; United Kingdom $3.
Diatomite and other infusorial earth	r7,080	3,864	3,356	Mexico 338; West Germany 85; Portugal 30.
Feldspar, fluorspar, related materials	3,141	4,058	1,018	Republic of South Africa 2,702; Finland 185; Mexico 61.
Fertilizer materials:				
Manufactured:				
Nitrogenous	191,497	35,567	2,065	Netherlands 16,077; Dominican Republic 9,000; Spain 4,000.
Phosphatic	r47,121	71,889	14,499	Yugoslavia 23,299; Belgium-Luxembourg 15,000; Italy 11,048.
Potassic	48,430	74,790	4,392	West Germany 52,547; Belgium-Luxembourg 9,032; Bahamas 8,800.
Unspecified and mixed	302,044	211,686	7,629	Finland 76,266; Romania 46,405; Denmark 30,139.
Graphite, natural	776	903	540	Canada 301; Mexico 36; West Germany 13.
Gypsum and plaster	28,094	29,893	726	Mexico 20,096; Spain 7,500; Colombia 605.
Lime	9,016	992	32	Colombia 960.
Magnesium compounds: Magnesite	5,163	3,014	382	Mexico 2,370; Australia 206; Spain 18.
Mica:				
Crude including splittings and waste	1,338	1,316	1,136	Brazil 126; France 25; West Germany 16.
Worked including agglomerated splittings	13	12	8	Republic of Korea 2; Brazil 1; Spain 1.
Phosphate, crude	95,040	54,290	2	Republic of South Africa 54,282; West Germany 3; Belgium-Luxembourg 2.
Pigments, mineral:				
Natural, crude	593	263	42	Spain 111; United Kingdom 109; Italy 1.
Iron oxides and hydroxides, processed	3,162	2,270	543	Spain 784; West Germany 516; Belgium-Luxembourg 124.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$292	$295	$42	Switzerland $47; Belgium-Luxembourg $37; Thailand $37.
Synthetic do.	$130	$174	$122	West Germany $10; Switzerland $9; Austria $7.
Pyrite, unroasted	122	44	44	
Salt and brine	17,256	78	32	West Germany 44; Spain 1.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	445	660	385	France 103; West Germany 93; Italy 57.
Sodium carbonate, natural and manufactured	119,480	98,853	95,474	Romania 2,525; Mexico 500; United Kingdom 326.
Sodium hydroxide	55,674	67,813	59,619	France 5,643; Peru 2,526.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7,698	8,963	162	Italy 5,471; Spain 1,054; Brazil 754.
Worked	282	316	7	Italy 283; Colombia 11; China 4.
Dolomite, chiefly refractory-grade	101,843	19,669	19,669	
Gravel and crushed rock	363	233	50	West Germany 100; Belgium-Luxembourg 63; Italy 9.
Limestone other than dimension	--	18,018	18,018	
Quartz and quartzite	53	134	14	West Germany 93; Finland 16; Czechoslovakia 11.
Sand other than metal-bearing	1,052	1,144	1,068	Italy 65; West Germany 6.
Sulfur:				
Elemental: Crude including native and byproduct	139	155	129	West Germany 26.
Dioxide	266	19,378	16,303	Sweden 3,014; United Kingdom 50; West Germany 10.
Sulfuric acid	36,323	57,598	13,488	West Germany 19,539; Switzerland 15,801; Belgium-Luxembourg 8,418.

Table 3.—Venezuela: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Talc, steatite, soapstone, pyrophyllite	8,379	8,034	5,777	Finland 863; China 413; France 258.
Other:				
Crude	70	120	--	France 72; Belgium-Luxembourg 45; Italy 2.
Slag and dross, not metal-bearing	17	12	2	Colombia 10.
Oxides and hydroxides of barium, magnesium, strontium	34,579	26,321	8,894	Republic of Korea 7,281; Brazil 5,036; Japan 3,006.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	3,040	5,794	1,479	France 3,958; Colombia 55; Spain 19.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	174	341	331	Mexico 10.
Carbon:				
Carbon black	NA	562	355	Canada 138; West Germany 68; Netherlands 1.
Gas carbon	NA	12	12	
Coal:				
Anthracite and bituminous	34,278	36,198	6,532	Colombia 28,666; Jamaica 1,000.
Briquets of anthracite and bituminous coal	9,811	419	--	Colombia 411; France 7.
Lignite including briquets	2,348	605	605	
Coke and semicoke	222,392	24,550	2,480	Colombia 16,131; United Kingdom 5,939.
Hydrogen, helium, rare gases	189	88	85	Japan 2; West Germany 1.
Peat including briquets and litter	61	28	--	All from West Germany.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	2,212	(2)	(2)	
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	650	221	174	West Germany 35; Netherlands 12.
Gasoline: Motor thousand 42-gallon barrels	219	298	230	West Germany 60; United Kingdom 8.
Mineral jelly and wax 42-gallon barrels	98,824	71,011	12,222	Japan 18,392; Brazil 15,126; West Germany 11,522.
Kerosine and jet fuel ---do---	5,549	4,921	2,286	Netherlands 2,372; West Germany 202; United Kingdom 54.
Distillate fuel oil ---do---	(2)	7	NA	NA.
Lubricants ---do---	162,743	71,316	30,107	Netherlands Antilles 19,663; Argentina 14,644; Netherlands 2,177.
Nonlubricating oils ---do---	196	49	49	
Residual fuel oil ---do---	(2)	60	60	
Bitumen and other residues ---do---	1,014,686	235,370	187,084	West Germany 40,087; Jamaica 7,981.
Bituminous mixtures ---do---	2,139	854	637	France 112; Netherlands 49; West Germany 42.
Petroleum coke ---do---	1,224,812	1,011,973	981,970	France 30,003.
Tars and other crude chemicals derived from coal, gas, and petroleum	29,651	12,981	10,891	Netherlands 1,168; United Kingdom 727; France 84.

[r]Revised. NA Not available.
[1]May include platinum-group metals.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The total aluminum production by VENALUM and ALCASA for 1982 was far below that of 1981. The large decrease in production in 1982 was the result of several factors. The damage to 250 pots at the VENALUM facility resulted in a major reduction in production in 1981, which carried over into 1982. The worldwide demand for aluminum decreased dramatically in 1982. Fire swept the anode fabricating plant at the VENALUM facility in March, halting all anode operations for at least 3 months. Damage was estimated at over $3 million.

A 3-year labor contract, valued at approximately $60 million, was agreed to by VENALUM executives and 1,600 workers in October 1982. In December 1982, the Export-Import Bank authorized a direct credit of $12 million toward the expansion of ALCASA's aluminum rolling and foil mill in Guacara, State of Carabobo. VENALUM has firm contracts for the sale of 200,000 tons of aluminum in 1983, of which 170,000 tons will go to Japan. Next year's sales are guaranteed by the 10-year sales contracts agreed upon with Japan and the renegotiated supply contracts with other companies. These provide for the exchange of ingot against supplies of alumina. VENALUM announced the signing of barter agreements with Jamaica to exchange aluminum for alumina. The agreements call for 900,000 tons of alumina to be supplied over 3 years. VENALUM was negotiating with other suppliers for additional barter agreements and was also scheduled to begin negotiations with INTERALUMINA on alumina purchases.

Bauxite.—BAUXIVEN will begin development of the Los Pijiguaos bauxite deposit, which is located in the northwestern part of the State of Bolívar. Mining is scheduled to commence in 1984 with an initial output of 2.65 million tons per year, increasing to 3.3 million tons per year in 1985. The Los Pijiguaos bauxite deposit contains 117 million tons of proven reserves and 500 million tons of potential reserves. The Los Pijiguaos operation will allow Venezuela to realize its aim of having an integrated aluminum industry.

FIV has provided $600 million for the initial phase of the bauxite project, consisting of basic and detailed engineering, preliminary minesite work, and required geological and related technical studies. The preparatory work for the bauxite project will employ 1,600 people during the first phase of construction. The bauxite mining operation itself will employ 500 people with an additional 2,000 people needed for support operations.

Venezuela was negotiating with Guyana to buy a substantial amount of bauxite for its aluminum industry. The original amount discussed was up to 1.8 million tons over 3 years, but after differences on contract terms were negotiated, the volume was reduced to 350,000 to 400,000 tons per year.

INTERALUMINA, Venezuela's new $1.25 billion alumina refinery, was 91% completed at yearend. It is expected to begin production in early 1983 and expects to reach its production capacity of 1 million tons per year by 1985. The plant will initially receive bauxite from Brazil, Sierra Leone, Suriname, and Guyana, if an agreement is reached.

Iron and Steel.—The 1982 revenue from raw steel sales was $965 million. This was an increase of about 7.5% over that of 1981.

At least 5.5 million tons of annual steelmaking capacity, planned to be built through 1995, has been deferred by SIDOR indefinitely because of projected slow growth and the lack of public sector financing. SIDOR, which has been under gradual development for the past 20 years, is to add 1.25 million annual tons of capacity by 1985, which was originally planned for by 1983.

Initial funding of $2.3 billion for the coal and steel project in the State of Zulia was approved by the National Government. The complete project will cost about $5.4 billion over the next 10 to 15 years. Corporación del Zulia C.A. (CORPOZULIA), the state-owned regional development organization, oversees the entire coal and steel project while Siderúrgica del Zulia C.A. manages the steel segment.

Steel wire rod from Venezuela was dumped in the U.S. market at prices 40% below fair value according to the U.S. Department of Commerce.

SIDOR intends to increase its 1983 output to 2.4 million tons while improving productivity; however, losses of $11.1 million are forecast primarily owing to servicing of the firm's debt of $3.25 billion.

In 1982, SIDOR sold 1.5 million tons of steel products to Venezuelan buyers and 240,000 tons to international clients. SIDOR's marketing projections for 1983 are 1.6 million tons to the domestic market and 300,000 tons internationally.

Charges were filed with the European Economic Community (EEC), by the West German and Italian steelmakers, that Venezuela and other countries had dumped steel products in European markets. Should any action be forthcoming from the EEC, Venezuela has threatened to take reciprocal action.

SIDOR's 2.1-million-ton-per-year stage two HYL direct-reduction iron plant underwent modifications in September 1982. It is expected to be ready for problem-free operation in about 6 months time, after more extensive repairs have been carried out.

Minerales Ordaz C.A., owned jointly by CVG and United States Steel Corp., permanently closed its high iron briquet plant at

Puerto Ordaz. Each partner will absorb about a $50 million loss. The plant is to be torn down and the equipment sold.

Ferrominera's iron ore production decreased approximately 19% from 1981 figures. Export figures in 1982 showed a decrease of 30% while domestic sales showed an increase of about 33% over those of 1981.

Ferroalloys.—Ferrosilicio de Venezolana S.A., the Government-owned ferrosilicon producer, was accused of dumping ferrosilicon in the European market at prices 26% or more below its production costs. The complaint was lodged by the Chambre Syndicale del Electrometallurgie of Italy and by Ferrolegierungen Stahl und Leichtmetallveredler of the Federal Republic of Germany on behalf of nine EEC producers representing about 85% of the EEC ferroalloys industry.

MINERAL FUELS

Coal.—An estimated 61,000 tons of coal was mined in Venezuela in 1982, a 25% increase over 1981 production. Semibituminous coal reserves were estimated at 3.6 billion tons by the Ministry of Energy and Mines.

The first phase of the Zulia coal project will be delayed from 1985 until late 1986 or early 1987 as announced by Carbones del Zulia C.A., the coal management arm of CORPOZULIA. The delay was attributed to problems in obtaining financing and to political problems.

Petroleum and Natural Gas.—Venezuela's proven oil reserves for 1982 were increased 1.2 billion barrels to 21.7 billion barrels. The increase in reserves is largely the result of continued delineation of heavy oil deposits in the Orinoco heavy oil belt.

At yearend, the Venezuelan Government was close to concluding a major supply and refining agreement with Veba AG of the Federal Republic of Germany, involving up to 100,000 barrels per day of heavy crude oil from the Orinoco heavy oil belt. Should an agreement be reached, Veba would become the first major long-term client for the heavy crude oil. PDVSA was also exploring a joint venture with Veba concerning a new heavy oil refinery in the Federal Republic of Germany.

The investment most affected by the 18% reduction in 1982 petroleum export revenues was the Desarrollo del Sur de Mongas y Anzoátegui (DSMA) heavy crude petroleum upgrading facility located in the States of Anzoátegui and Mongas. Lagoven, a subsidiary of PDVSA, originated plans for the DSMA project, which called for investments of $7 billion through 1988, to build a 125,000-barrel-per-day facility; however, the projected expenditures were reduced by about $2.3 billion. In addition, PDVSA's operating budget was cut by approximately $460 million.

Venezuela had 1.33 trillion cubic meters of proven natural gas reserves in 1982, an increase of 200 billion cubic meters over that of 1981.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Venezuelan bolivars (Bs) to U.S. dollars at the rate of Bs4.29=US$1.00.

The Mineral Industry of Yugoslavia

By Roman V. Sondermayer[1]

Shortages of fuels, electric power, capital, and foreign exchange, as well as the world economic slowdown, hampered activities of the mineral industry of Yugoslavia during 1982.

Restrictions imposed by the Government on investments and new foreign loans slowed down development. The more prominent minerals, with Yugoslav production expressed as a percentage of 1982 world output, were as follows: antimony, 2% to 3%; bauxite, 3% to 4%; lead (mine), 3% to 4%; bismuth, 2% to 3%; zinc (mine and smelter), 2% to 3%; and copper ore, refined copper, and aluminum, all 1% to 2%.

In 1981, the latest year for which complete data were available, the mineral industry's share of the gross social product was 7.4% and the mineral industry employed 6.1% of the total working labor force. By sectors, the value of production and number of persons employed in the mineral industry are shown in the following tabulation:[2]

Branch	Production value (million dinars)	Employment (thousands)
Coal:		
Production	22,635	56.4
Processing	2,374	3.3
Crude oil:		
Production	15,711	4.1
Processing	14,225	10.1
Iron and steel:		
Iron ore production	1,440	5.0
Steel production	25,957	54.8
Nonferrous metals:		
Production of ores	10,655	29.2
Metal production	7,233	17.4
Metal processing	7,973	14.4
Nonmetallics:		
Production	4,037	12.9
Processing	17,221	51.6
Sand and gravel	7,460	24.2
Construction materials	26,359	76.0
Total	163,280	359.4

The major events in the mineral industry included the completion of a new copper mine and mill at Krivelj, completion of the first nickel-producing facility in the country at Kavadarci, startup of a new coke battery at Zenica, and the awarding of a concession for joint exploration ventures to Industrija Nafte (INA), the Yugoslav Government's petroleum company, and foreign oil companies in Yugoslav territorial waters in the Adriatic Sea.

PRODUCTION

The latest trends in the production of minerals by the mineral industry of Yugoslavia, which is all Government-owned, are shown in table 1.

Table 1.—Yugoslavia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum:					
Bauxite thousand tons	2,565	3,012	3,138	3,249	[3]3,668
Alumina	496,479	836,428	1,058,366	1,037,227	1,000,000
Metal ingot:					
Primary	175,950	167,681	161,366	172,683	210,000
Secondary	19,758	21,841	23,394	24,084	36,363
Total	195,708	189,522	184,760	196,767	[3]246,363
Antimony:					
Mine output of ores, gross weight	106,680	91,335	70,062	66,517	62,000
Mine output, metal content	2,676	2,037	1,680	1,455	1,400
Concentrates, gross weight	5,542	4,480	3,809	3,413	3,200
Metal (regulus)	1,791	2,401	2,237	2,198	[3]1,872
Bismuth, smelter output	13	23	83	102	[3]49
Cadmium, smelter output	187	289	201	208	205
Chromium:					
Chromite ore (domestic production)	1,907	168	--	--	--
Chromite concentrate (produced largely from imported ores)	52,771	90,500	99,012	105,135	110,000
Copper:					
Mine and concentrator output:					
Ore, gross weight thousand tons	17,098	16,446	19,559	18,337	[3]19,733
Cu content of ores	123,319	111,421	114,786	110,961	110,000
Concentrate, gross weight thousand tons	508	478	496	478	480
Metal:					
Blister and anodes:					
Primary	107,507	108,732	93,745	92,505	92,000
Remelted[4]	87,666	71,250	78,617	86,175	86,000
Refined:					
Primary	103,906	99,224	91,755	90,660	90,000
Secondary	46,922	38,280	39,533	41,943	36,870
Total	150,828	137,504	131,288	132,603	[3]126,870
Gold, refined troy ounces	142,556	138,987	106,226	115,164	122,000
Iron and steel:					
Iron ore:					
Gross weight thousand tons	4,564	4,617	4,530	4,794	5,106
Fe content do	1,621	1,619	1,413	1,510	1,582
Iron concentrate do	1,713	1,636	2,097	2,451	2,500
Metal:					
Pig iron do	2,081	2,360	2,425	2,817	2,693
Ferroalloys:					
Ferrochromium	51,213	65,622	68,564	69,194	59,000
Ferromanganese	37,470	45,591	33,738	51,126	42,000
Ferrosilicon	60,189	67,884	66,171	80,201	70,000
Silicon metal	30,670	31,598	30,094	28,358	24,000
Ferrosilicomanganese	27,857	28,786	33,097	28,600	19,000
Ferrosilicochromium	7,998	6,785	10,326	5,873	6,000
Other	3,132	3,521	630	1,072	1,000
Total	218,529	249,787	242,620	264,424	[3]221,000
Crude steel:					
From oxygen converters thousand tons	1,048	1,071	1,149	1,424	[3]1,349
From Siemens-Martin furnaces do	1,494	1,476	1,459	1,504	[3]1,464
From electric furnaces do	909	990	1,026	1,048	[3]1,037
Total do	3,451	3,537	3,634	3,976	[3]3,850
Semimanufactures do	4,142	4,140	4,244	4,780	[3]4,513
Lead:					
Mine and concentrator output:					
Ore, gross weight (lead-zinc ore) do	4,078	4,115	4,284	4,365	4,252

See footnotes at end of table.

Table 1.—Yugoslavia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
METALS —Continued					
Lead —Continued					
Mine and concentrator output —Continued					
Pb content of ores	129,389	129,776	121,465	118,556	115,000
Concentrate, gross weight	163,501	168,971	158,191	155,791	150,000
Metal:					
Smelter:					
Primary	100,300	92,000	85,000	74,000	75,000
Secondary[5]	40,069	41,603	39,664	46,456	45,000
Total	140,369	133,603	124,664	120,456	120,000
Refined:					
Primary[6]	100,300	92,040	84,751	73,901	71,000
Secondary	16,400	19,000	17,000	12,500	10,248
Total	116,700	111,040	101,751	86,401	[3]81,248
Magnesium metal	--	--	--	3,859	4,000
Manganese ore:					
Gross weight	27,400	30,150	30,250	31,149	30,000
Mn content	9,771	10,552	10,624	10,872	10,000
Nickel:					
Nickel content of ore	--	[e]1,500	[e]1,500	[e]8,000	16,000
Nickel content of ferronickel	--	--	--	--	8,000
Platinum-group metals:					
Palladium troy ounces	5,562	5,241	4,501	3,119	3,000
Platinum do.	417	675	418	482	480
Selenium, refined kilograms	52,840	46,257	45,140	35,600	35,000
Silver, refined, including secondary thousand troy ounces	5,125	5,214	4,790	4,437	[3]3,343
Zinc:[7]					
Zn content of lead and zinc ore	103,794	101,699	95,253	88,640	87,000
Concentrator output, gross weight	173,817	167,907	154,845	150,366	148,000
Smelter including secondary	95,232	98,906	84,537	96,370	[3]86,767
NONMETALS					
Asbestos, all kinds	10,360	10,041	12,106	13,591	[3]11,657
Barite	42,800	46,073	47,818	44,179	45,000
Cement, hydraulic thousand tons	8,698	[r]9,082	9,315	9,780	9,700
Clays:					
Fire clay:					
Crude	354,635	390,759	427,525	691,606	690,000
Calcined	110,863	105,680	74,460	72,804	72,000
Kaolin	180,017	177,958	197,124	224,797	220,000
Feldspar, crude	48,013	56,160	57,710	53,240	54,000
Gypsum:					
Crude thousand tons	503	568	619	669	670
Calcined	99,722	119,041	132,982	123,194	125,000
Lime:					
Quicklime thousand tons	1,297	1,526	1,504	1,614	1,700
Hydrated do.	758	875	880	950	1,000
Total do.	2,055	2,401	2,384	2,564	2,700
Magnesite:					
Crude	333,000	[r]293,305	261,841	299,676	300,000
Sintered	151,782	145,723	147,808	154,339	[3]328,000
Caustic calcined	8,166	9,939	11,343	14,841	15,000
Mica, all grades	69	338	249	265	270
Nitrogen: N content of ammonia thousand tons	416	[r]418	404	421	420
Pumice and related volcanic materials: Volcanic tuff	247,811	170,594	360,438	533,679	550,000
Quartz, quartzite, glass sand:					
Quartz and quartzite thousand tons	227	239	200	212	220
Glass sand do.	1,717	1,923	2,100	2,424	2,480
Total do.	1,944	2,162	2,300	2,636	2,700
Salt:					
Marine	20,966	20,500	22,081	36,185	NA
From brines	192,000	[r]191,696	186,435	189,976	NA
Rock	85,231	137,441	168,921	192,579	NA
Total	298,197	[r]349,637	377,437	418,740	[3]428,000
Sand and gravel (except glass sand) thousand cubic meters	20,692	22,645	27,029	26,589	[3]24,912
Sodium compounds: Sodium carbonate	166,350	164,382	129,069	147,156	[3]181,880

See footnotes at end of table.

Table 1.—Yugoslavia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Stone (except quartz and quartzite):					
Dimension:					
Crude:					
Ornamental thousand cubic meters	58	69	71	78	NA
Other do.	10	5	2	1	NA
Partly worked facing thousand square meters	1,074	1,274	1,944	2,058	[3]2,134
Cobblestones, curbstones, other thousand cubic meters	17	10	27	38	NA
Dolomite thousand tons	557	673	668	928	NA
Limestone do.	3,778	4,125	4,061	4,081	NA
Shale do.	7,603	[r]8,055	8,386	8,759	NA
Crushed and broken, n.e.s. thousand cubic meters	6,785	8,703	[e]9,000	NA	NA
Milled marble and other do.	6,234	8,813	18,239	18,420	NA
Sulfur, pyrite, pyrrhotite:					
Pyrite, gross weight thousand tons	406	452	607	652	660
Pyrrhotite, gross weight do.	--	--	22	29	30
Sulfur:[8]					
Sulfur content of pyrite do.	171	190	252	274	277
Sulfur content of pyrrhotite do.	--	--	9	12	13
Byproduct:					
Of metallurgy[e] do.	200	200	200	200	200
Of petroleum[e] do.	5	5	5	4	4
Total[e] do.	376	395	466	490	494
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	25,823	23,261	26,232	23,945	25,000
Coal:					
Bituminous thousand tons	471	434	388	384	[3]389
Brown do.	8,854	9,351	9,665	10,581	[3]10,744
Lignite do.	30,359	32,329	36,949	41,279	[3]43,545
Total do.	39,684	42,114	47,002	52,244	54,678
Coke:					
Metallurgical do.	1,778	2,161	2,285	2,349	NA
Breeze do.	143	175	177	171	NA
Foundry do.	150	151	166	174	NA
Total do.	2,071	2,487	2,628	2,694	2,779
Gas:					
Manufactured (excluding petroleum refinery gas):					
From coke plants million cubic feet	14,117	[r]18,893	[e]20,000	29,620	NA
From lignite gasification plants do.	4,025	[r]3,743	[e]4,000	44,096	NA
From other gas generators do.	721	[r]388	--	--	--
Natural, gross production do.	68,334	65,579	64,272	77,585	80,728
Natural gas plant liquids:					
Natural gasoline and pentane thousand 42-gallon barrels	98	149	NA	NA	NA
Propane and butane do.	590	531	533	746	NA
Total do.	688	680	NA	NA	NA
Petroleum:					
Crude:					
As reported thousand tons	4,076	4,143	4,229	4,375	4,340
Converted thousand 42-gallon barrels	30,190	30,687	31,324	32,405	32,146
Refinery products:[9]					
Gasoline do.	20,230	22,177	21,930	20,119	[3]22,083
Liquefied petroleum gas do.	2,873	2,898	2,888	2,818	NA
Jet fuel do.	2,437	2,695	2,736	2,480	NA
Kerosine do.	81	254	100	109	NA
Distillate fuel oil: Diesel do.	25,894	29,214	24,790	22,924	[3]24,546
Residual fuel oil do.	40,753	43,217	33,373	27,672	[3]35,990
Lubricants do.	2,713	2,898	3,325	3,352	[3]3,045
Paraffin do.	104	125	142	133	NA
White spirit do.	276	250	221	247	NA
Asphalt and bitumen do.	3,842	4,497	3,897	3,527	NA
Petroleum coke do.	362	300	237	370	NA

See footnotes at end of table.

Table 1.—Yugoslavia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products[9] —Continued					
Other ____ thousand 42-gallon barrels	--	--	2,458	11,257	NA
Total[9] ____ do ____	99,565	108,525	96,097	95,008	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through June 16, 1983.

[2]In addition to the commodities listed, germanium, bentonite, common clay, and diatomite are also produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output levels. Mercury production was discontinued because of low prices.

[3]Reported figure.

[4]Includes undetermined quantity of secondary raw material.

[5]Calculated as the difference between reported total and reported primary figure.

[6]Calculated as the difference between reported total and reported secondary figure.

[7]For ore production, see under "Lead."

[8]Calculated from pyrite and pyrrhotite concentrate; using 42% as average sulfur content.

[9]Excludes refinery gas, which was as follows, in million cubic feet: 1978—14,086, 1979—15,050, and 1980 and 1981—not available.

TRADE

Foreign trade in minerals is shown in tables 2 and 3 for the latest years for which complete data are available. During 1981, imports of minerals shared 38% in the total value of the country's imports. Imports of fuels accounted for 63% of total mineral imports. Exports of minerals were 17% of total country exports.

Table 2.—Yugoslavia: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate ____	246,821	266,055	--	Canada 125,253; Romania 76,721; U.S.S.R. 64,057.
Oxides and hydroxides ____	653,424	633,127	--	U.S.S.R. 521,987; Poland 94,424; Czechoslovakia 16,716.
Metal including alloys:				
Scrap ____	276	177	--	West Germany 91; France 86.
Unwrought ____	53,872	58,471	--	East Germany 34,025; Czechoslovakia 5,500; France 4,300.
Semimanufactures ____	57,395	48,210	8,617	Czechoslovakia 14,068; East Germany 5,372; West Germany 2,976.
Antimony: Metal including alloys, regulus ____	1,055	1,220	--	U.S.S.R. 820; Bulgaria 400.
Cadmium: Metal including alloys, all forms ____	105	35	--	Czechoslovakia 30; Hungary 4.
Chromium:				
Ore and concentrate ____	11,537	12,463	--	All to Czechoslovakia.
Oxides and hydroxides ____	4	10	--	All to West Germany.
Cobalt: Oxides and hydroxides ____ value	$1,341	$3,915	--	All to Switzerland.
Columbium and tantalum: Metal including alloys, all forms, tantalum ____ do	--	$41,258	--	All to West Germany.
Copper:				
Ore and concentrate ____	16,131	--		
Matte and speiss including cement copper ____	--	252	--	All to Bulgaria.
Sulfate ____	10,535	7,355	--	Italy 7,208; Tunisia 80; Netherlands 40.
Metal including alloys:				
Scrap ____	6,129	4,035	--	Italy 2,139; West Germany 1,088; Albania 366.
Unwrought ____	14,334	13,801	3,107	Italy 3,991; United Kingdom 3,257; East Germany 2,209.
Semimanufactures ____	34,685	36,211	4,122	Italy 6,568; West Germany 5,275.

Table 2.—Yugoslavia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate: Excluding roasted pyrite	(1)	29,194	--	All to Hungary.
Pyrite, roasted	74,168	109,597	--	Hungary 60,531; West Germany 35,550; Austria 13,516.
Metal:				
Scrap	44,833	59,229	--	Italy 54,387; West Germany 3,052; Switzerland 1,043.
Pig iron, cast iron, related materials	50,811	25,518	--	Hungary 17,166; Austria 3,036; Italy 2,757.
Ferroalloys:				
Ferrochromium	50,130	63,087	41,748	Italy 6,523; Austria 4,092; Japan 2,316.
Ferromanganese	8,049	21,304	11,725	Italy 3,873; Austria 1,931; Turkey 1,600.
Ferrosilicomanganese	23,240	17,847	16,269	Italy 1,500; Albania 78.
Ferrosilicon	36,705	61,585	3,757	Italy 16,583; West Germany 9,665; Japan 8,123.
Unspecified	2,434	1,157	800	Italy 357.
Steel, primary forms	21,406	23,967	--	Poland 15,938; Hungary 7,428; Italy 582.
Semimanufactures:				
Bars, rods, angles, shapes, sections	93,694	121,378	--	Romania 22,346; West Germany 18,734; Iraq 16,589.
Universals, plates, sheets	9,659	24,646	46	Bulgaria 4,926; Poland 4,897; West Germany 4,607.
Hoop and strip	8,598	12,679	--	Poland 7,256; Czechoslovakia 4,504; Bulgaria 543.
Rails and accessories	14,172	10,129	--	Romania 5,243; Albania 4,397; Greece 306.
Wire	5,530	8,572	--	Czechoslovakia 2,380; Poland 2,308; Albania 1,101.
Tubes, pipes, fittings	111,321	104,876	11,105	East Germany 20,108; Libya 9,437; Algeria 6,632.
Castings and forgings, rough	4,986	6,785	--	Czechoslovakia 1,879; Austria 1,544; West Germany 1,085.
Lead:				
Ore and concentrate	10,070	12,864	--	Turkey 7,395; Bulgaria 4,125; Switzerland 1,080.
Oxides	2	157	--	Italy 150; West Germany 4; Iraq 2.
Metal including alloys:				
Scrap	(1)	--		
Unwrought	27,564	15,697	--	Czechoslovakia 7,895; U.S.S.R. 3,278; Austria 2,887.
Semimanufactures	1,476	169	--	Austria 124; Italy 45.
Magnesium: Metal including alloys:				
Scrap	3	34	--	All to West Germany.
Unwrought	1,843	2,818	51	West Germany 1,966; Poland 309; Bulgaria 110.
Semimanufactures	86	169	--	Austria 124; Italy 45.
Manganese: Ore and concentrate, metallurgical-grade	--	1,274	--	All to Italy.
Mercury 76-pound flasks	--	2,901	2,900	NA.
Metalloids:				
Arsenic: Metal including alloys, all forms	36	NA	--	
Silicon	20,437	22,932	5,151	U.S.S.R. 9,535; Poland 2,711; West Germany 2,092.
Unspecified	--	36	2	West Germany 24; United Kingdom 10.
Molybdenum: Metal including alloys, all forms kilograms	634	1,000	--	All to West Germany.
Nickel:				
Ore and concentrate	(1)	--		
Matte and speiss	99	--		
Metal including alloys:				
Scrap	288	148	--	Switzerland 114; West Germany 24.
Unwrought	230	189	--	Italy 103; Austria 86.
Semimanufactures	80	12	--	West Germany 7; Italy 2.
Platinum-group metals:				
Waste and sweepings value	$113,575	$158,302	--	All to West Germany.
Metal including alloys, unwrought and partly wrought, unspecified troy ounces	4,308	--		

See footnotes at end of table.

Table 2.—Yugoslavia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Silver:				
Ore and concentrate[2] ____ value__	$1,096	--		
Waste and sweepings ____ do____	$692,713	$253	--	All to West Germany.
Metal including alloys, unwrought and partly wrought thousand troy ounces__	1,946	1,575	739	Czechoslovakia 482; West Germany 193; United Kingdom 129.
Tin: Metal including alloys:				
Unwrought ____	49	56	--	West Germany 33; Austria 16; Iraq 6.
Semimanufactures____	3	(1)	--	Mainly to U.S.S.R. and Czechoslovakia.
Titanium: Oxides____	11,353	12,559	102	East Germany 10,865; Romania 1,340; Italy 252.
Tungsten: Metal including alloys, all forms ____	4	19	3	West Germany 14; United Kingdom 2.
Zinc:				
Ore and concentrate____	8,831	6,047	--	Bulgaria 5,518; Austria 529.
Oxides ____	193	2,217	--	Romania 1,045; Hungary 770; Italy 367.
Metal including alloys:				
Scrap ____	35	--		
Unwrought____	19,565	21,901	1,501	Czechoslovakia 12,357; Hungary 5,801; West Germany 1,201.
Semimanufactures ____	9,105	9,501	--	Czechoslovakia 6,322; Hungary 1,010; West Germany 658.
Other:				
Oxides and hydroxides ____	162	106	--	Sweden 105.
Ashes and residues____	31,086	3,880	--	Italy 2,905; Austria 500; West Germany 475.
Base metals including alloys, all forms	4	9	--	Mainly to West Germany.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc ____ value__	$289	$422	--	East Germany $338; Bulgaria $56.
Artificial: Corundum ____	15,486	11,747	--	Romania 3,839; Italy 2,191; West Germany 1,941.
Grinding and polishing wheels and stones ____	2,820	1,776	13	Romania 321; West Germany 247; Italy 242.
Asbestos, crude ____	2,506	2,938	--	Albania 2,568; Iran 300; Romania 68.
Barite and witherite____	19,077	16,200	--	All to Hungary.
Boron materials: Oxides and acids ____	214	2,207	--	West Germany 839; Switzerland 580; Romania 460.
Cement____	406,746	766,469	1,670	Egypt 250,938; Libya 117,050; Sudan 86,560.
Chalk____	53	(1)	--	All to U.S.S.R. and Iraq.
Clays and clay products:				
Crude:				
Bentonite____	1,401	348	--	U.S.S.R. 283; Tunisia 45; Albania 20.
Chamotte earth ____	--	37	--	Hungary 30; Iraq 2.
Fire clay ____	12,467	16,409	--	Italy 8,361; Greece 6,460; Hungary 1,123.
Kaolin ____	6,587	--		
Unspecified ____	482	405	--	West Germany 369; Greece 30.
Products:				
Nonrefractory____	16,241	35,341	--	U.S.S.R. 16,816; Hungary 4,462; Libya 2,987.
Refractory including nonclay brick ____	80,674	57,935	--	Romania 31,141; West Germany 10,179; Poland 2,250.
Cryolite and chiolite ____	10	5	--	All to Malta.
Diamond: Industrial ____ value__	--	$11,490	--	All to United Kingdom.
Feldspar, fluorspar, related materials:				
Feldspar____	11,498	3,109	--	Hungary 1,800; Czechoslovakia 800; Greece 498.
Fertilizer materials: Manufactured:				
Ammonia ____	36	(1)	--	Mainly to Burma.
Nitrogenous____	60,471	91,401	--	Turkey 53,458; West Germany 19,363; Ecuador 10,498.
Phosphatic ____	203,469	175,205	--	U.S.S.R. 84,859; Hungary 81,286; Turkey 8,915.
Unspecified and mixed ____	429,090	245,774	--	Hungary 96,745; Italy 44,699; West Germany 37,021.
Graphite, natural ____	23	4	--	All to West Germany.

See footnotes at end of table.

Table 2.—Yugoslavia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Gypsum and plaster	3,827	436	--	Libya 420; U.S.S.R. 12; Iraq 3.
Lime	72,158	70,835	--	Hungary 68,158; Iraq 1,139; Ethiopia 1,000.
Magnesium compounds:				
Magnesite	102	50	--	All to Bulgaria.
Other	24,219	29,310	--	U.S.S.R. 20,607; Italy 4,812; Hungary 2,047.
Mica: Worked including agglomerated splittings	(1)	1	--	All to West Germany.
Nitrates, crude	--	4	--	All to Iraq.
Pigments, mineral: Iron oxides and hydroxides, processed	1	16	--	Hungary 15; Italy 1.
Pyrite, unroasted	67,941	14,428	--	Bulgaria 12,271; West Germany 2,154.
Salt and brine	2,812	1,642	--	Hungary 1,604; Canada 36.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1,208	2,611	--	Italy 1,471; Greece 695; Albania 315.
Sodium carbonate, natural and manufactured	2,132	2,774	--	Italy 2,772; Iraq 2.
Sodium hydroxide	12,044	12,295	--	U.S.S.R. 7,910; Italy 1,507; Turkey 1,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	56,354	48,647	--	Italy 27,942; Czechoslovakia 11,497; East Germany 2,842.
Worked	8,282	7,374	23	West Germany 2,250; Austria 2,232; Libya 622.
Dolomite, chiefly refractory-grade	--	1	--	All to Malta.
Gravel and crushed rock	8,553	5,224	--	Hungary 2,673; Italy 1,267; Czechoslovakia 393.
Quartz and quartzite	12,124	10,002	--	West Germany 9,975; Iraq 13; Greece 5.
Sand other than metal-bearing	6,703	7,014	--	Greece 3,162; Albania 2,294; Libya 972.
Sulfur:				
Elemental:				
Crude including native and byproduct	1,138	2,039	--	Bulgaria 2,010; Hungary 29.
Colloidal, precipitated, sublimed	192	85	--	All to Australia.
Sulfuric acid	119	145	--	Italy 135; Sudan 5; Iraq 3.
Talc, steatite, soapstone, pyrophyllite	810	630	--	Albania 610; Italy 20.
Other:				
Crude	4,578	656	--	Pakistan 292; Austria 229; Albania 62.
Slag and dross, not metal-bearing	1,384	1,224	--	Austria 911; France 159; Switzerland 153.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	27,013	36,596	--	Iraq 15,308; Libya 10,545; Iran 3,451.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	123	43	--	Iraq 22; East Germany 9; Austria 8.
Carbon: Carbon black	1,414	2,489	--	Czechoslovakia 2,448; Poland 36; France 4.
Coal:				
Anthracite	--	9	--	All to West Germany.
Bituminous	--	3	--	All to Iraq.
Lignite including briquets	397,493	520,131	--	Austria 463,210; United Kingdom 29,331; Italy 19,927.
Coke and semicoke	205,319	35,001	--	Hungary 24,300; Romania 10,699.
Hydrogen, helium, rare gases	250	478	--	Austria 384; Italy 88.
Peat including briquets and litter	481	1,510	--	Italy 749; Austria 679; Israel 80.
Petroleum refinery products:				
Gasoline:				
Aviation 42-gallon barrels	703	730	9	United Kingdom 365; West Germany 223; Bulgaria 62.
Motor thousand 42-gallon barrels	3,600	2,654	(1)	Netherlands 2,373; Switzerland 172; Austria 48.
Mineral jelly and wax 42-gallon barrels	29,646	18,880	--	West Germany 13,568; Italy 3,022; Libya 763.
Kerosine and jet fuel do	r222,379	318,339	1,325	United Kingdom 52,940; France 51,468; Austria 37,940.

See footnotes at end of table.

Table 2.—Yugoslavia: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products —Continued				
Distillate fuel oil -42-gallon barrels	104,589	264,614	2,447	Austria 174,676; West Germany 43,850; Greece 9,370.
Lubricants do	396,620	370,265	--	West Germany 256,123; Czechoslovakia 52,367; Switzerland 19,768.
Residual fuel oil do	46,720	26,094	--	Malta 10,117; U.S.S.R. 4,862; Panama 4,043.
Bitumen and other residues do	r42	64,181	--	Lichtenstein 43,765; Switzerland 18,047; Austria 2,260.
Bituminous mixtures do	2,612	3,254	--	Libya 2,551; U.S.S.R. 400; Bulgaria 158.
Petroleum coke do	23,892	42,906	--	All to West Germany.
Tars and other crude chemicals derived from coal, gas, and petroleum	43,090	44,737	--	Italy 42,193; West Germany 1,215; France 952.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include other precious metals.

Table 3.—Yugoslavia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals, unspecified	118	122	3	France 80; Italy 30; West Germany 9.
Aluminum:				
Ore and concentrate	217,595	394,180	--	Guinea 323,146; Greece 32,373; Ghana 14,415.
Oxides and hydroxides	1,285	60,623	14	Guinea 57,429; France 1,961; West Germany 1,148.
Metal including alloys:				
Scrap	[1]	--		
Unwrought	58,638	51,833	9	U.S.S.R. 42,992; Netherlands 2,495; Egypt 2,284.
Semimanufactures	8,592	16,419	2	United Kingdom 5,730; France 3,394; West Germany 2,689.
Antimony:				
Ore and concentrate	4,201	--		
Metal including alloys, regulus	[1]	--		
Beryllium: Metal including alloys, all forms value	$6,310	$8,111	--	Denmark $7,322; West Germany $789.
Bismuth: Metal including alloys, all forms	4	[1]	--	All from Switzerland.
Cadmium: Metal including alloys, all forms	--	12	12	
Chromium:				
Ore and concentrate	278,799	325,498	--	U.S.S.R. 88,388; Philippines 5,078; Albania 223.
Oxides and hydroxides	784	728	--	U.S.S.R. 550; West Germany 115; Switzerland 43.
Cobalt: Oxides and hydroxides	17	53	3	West Germany 39; Netherlands 6; Austria 2.
Columbium and tantalum: Metal including alloys, all forms, tantalum	1	2	1	West Germany 1.
Copper:				
Ore and concentrate	47,817	11,561	--	Peru 10,755; Italy 806.
Sulfate	1,030	1,025	--	U.S.S.R. 1,018; Switzerland 6.
Metal including alloys:				
Scrap	--	88	--	All from Nigeria.
Unwrought	50,412	67,037	2	Zambia 31,023; Chile 16,943; Peru 10,160.
Semimanufactures	2,309	5,544	9	West Germany 2,693; Italy 1,263; Poland 600.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	1,640	1,360	--	Peru 757; India 231; Mauritania 174.
Pyrite, roasted	50	--		
Metal:				
Scrap	395,759	479,327	(1)	U.S.S.R. 328,597; Bulgaria 37,510; Poland 24,928.
Pig iron, cast iron, related materials	48,677	97,858	1	Venezuela 25,106; West Germany 21,836; Brazil 20,355.
Ferroalloys:				
Ferrochromium	130	118	--	West Germany 85; Sweden 30.
Ferromanganese	903	539	--	West Germany 420; France 70; Norway 21.
Ferromolybdenum	740	522	--	Austria 248; Sweden 114; West Germany 79.
Ferrosilicomanganese	--	15	--	All from France.
Ferrosilicon	1,519	1,556	--	West Germany 1,385; France 141; Norway 23.
Unspecified	3,592	3,225	--	West Germany 1,381; France 1,334; Austria 290.
Steel, primary forms	994,908	925,956	557	Czechoslovakia 313,770; U.S.S.R. 201,026; Spain 66,484.
Semimanufactures:				
Bars, rods, angles, shapes, sections	222,768	271,284	3	Czechoslovakia 64,463; Poland 33,218; U.S.S.R. 30,318.
Universals, plates, sheets	471,182	566,219	54	Czechoslovakia 100,807; Italy 85,038; West Germany 73,282.
Hoop and strip	129,432	111,932	5	Poland 35,659; West Germany 35,382; U.S.S.R. 9,780.
Rails and accessories	28,499	5,795	--	West Germany 2,276; Austria 1,840; U.S.S.R. 1,627.
Wire	43,374	37,464	2	Czechoslovakia 14,775; West Germany 5,516; Austria 3,369.
Tubes, pipes, fittings	69,601	85,357	18	East Germany 18,328; West Germany 15,552; Italy 11,692.
Castings and forgings, rough	2,639	2,722	27	Czechoslovakia 1,015; West Germany 451; Spain 407.
Lead:				
Ore and concentrate	2,731	1,023	--	All from Greece.
Oxides	2,994	2,939	4	Austria 1,028; Bulgaria 822; East Germany 460.
Metal including alloys:				
Unwrought	10,161	12,118	--	Peru 6,588; Mexico 3,445; Bulgaria 994.
Semimanufactures	23	62	10	West Germany 35; France 12; Austria 5.
Magnesium: Metal including alloys:				
Scrap	--	(1)	--	All from United Kingdom.
Unwrought	863	35	--	Norway 24; France 10.
Semimanufactures	14	45	--	Switzerland 25; Austria 12; West Germany 4.
Manganese:				
Ore and concentrate, metallurgical-grade	131,053	87,741	--	U.S.S.R. 41,211; Botswana 28,719; Gabon 15,945.
Oxides	1,176	965	--	Netherlands 200; West Germany 192; Belgium-Luxembourg 158.
Mercury 76-pound flasks	541	1,305	NA	West Germany 522; United Kingdom 435; Netherlands 261.
Metalloids:				
Arsenic:				
Oxides and acids	102	101	(1)	Belgium-Luxembourg 68; West Germany 17; France 8.
Metal including alloys, all forms	85	56	--	Netherlands 25; West Germany 18; Belgium-Luxembourg 12.
Silicon	226	408	(1)	France 309; East Germany 94.
Unspecified	--	126	--	West Germany 76; U.S.S.R. 50.
Molybdenum: Metal including alloys, all forms	15	15	--	Austria 13; United Kingdom 1.
Nickel:				
Matte and speiss	90	109	--	Netherlands 104; West Germany 5.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Nickel —Continued				
Metal including alloys:				
Scrap	(1)	(1)	--	All from West Germany.
Unwrought	1,960	2,150	1	U.S.S.R. 1,806; Canada 228; West Germany 106.
Semimanufactures	776	1,084	200	West Germany 382; U.S.S.R. 212; Italy 40.
Platinum-group metals: Metal including alloys, unwrought and partly wrought:				
Platinum value, thousands	$1,329	$1,164	--	U.S.S.R. $364; West Germany $305; Italy $27.
Unspecified do	$1,559	$2	$2	
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	16,543	547	(1)	West Germany 322; Sweden 129.
Tin:				
Ore and concentrate	2	--		
Oxides	5	7	--	Mainly from West Germany.
Metal including alloys:				
Scrap	--	(1)	(1)	
Unwrought	1,031	959	(1)	Malaysia 440; Bolivia 165; China 158.
Semimanufactures	36	95	(1)	West Germany 62; East Germany 17; United Kingdom 10.
Titanium:				
Ore and concentrate	52,142	47,232	--	Australia 47,212; West Germany 20.
Oxides	1,961	1,760	120	West Germany 921; Belgium-Luxembourg 339; France 307.
Tungsten: Metal including alloys:				
Unwrought	12	5	--	Austria 4; Poland 1.
Semimanufactures	12	8	(1)	Netherlands 3; West Germany 2; Austria 1.
Uranium and/or thorium: Ore and concentrate	--	2	--	All from United Kingdom.
Zinc:				
Ore and concentrate	65,227	56,385	--	Peru 13,564; North Korea 13,555; Mexico 8,079.
Oxides	808	1,002	(1)	West Germany 725; Austria 156; Netherlands 73.
Metal including alloys:				
Scrap	(1)	--		
Unwrought	7,209	15,818	--	Zambia 6,702; West Germany 2,467; Algeria 2,033.
Semimanufactures	45	175	--	Italy 148; France 18; Belgium-Luxembourg 5.
Other:				
Ores and concentrates	1,832	5,728	--	China 2,516; Australia 1,249; Morocco 914.
Oxides and hydroxides	1,304	1,239	5	West Germany 566; Norway 205; Japan 174.
Ashes and residues	2,022	1,882	--	Austria 1,003; Switzerland 879.
Pyrophoric alloys	4	6	--	France 3; China 2.
Base metals including alloys, all forms	703	441	114	Netherlands 156; West Germany 54; China 35.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	304	198	--	Denmark 92; Italy 55; West Germany 24.
Artificial: Corundum	1,460	1,510	2	West Germany 1,208; Austria 205; France 68.
Dust and powder of precious and semi-precious stones including diamond value	$572,550	$662,499	$8,899	U.S.S.R. $345,725; Switzerland $235,947; United Kingdom $33,795.
Grinding and polishing wheels and stones	656	667	15	Austria 264; Italy 120; West Germany 96.
Asbestos, crude	60,023	57,762	20	U.S.S.R. 36,136; Canada 10,265; Botswana 7,770.
Barite and witherite	1,146	490	--	Czechoslovakia 215; West Germany 203; U.S.S.R. 60.
Boron materials:				
Crude natural borates	32,717	40,061	21,547	Turkey 17,527; Italy 987.
Oxides and acids	69	879	--	U.S.S.R. 551; France 285; West Germany 22.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Cement	793,007	659,971	--	U.S.S.R. 301,936; Hungary 134,731; Czechoslovakia 103,090.
Chalk	1,108	975	--	France 504; United Kingdom 231; Austria 140.
Clays and clay products:				
Crude:				
Bentonite	21	9	--	Austria 4; Italy 4.
Chamotte earth	2,078	2,981	(1)	Czechoslovakia 2,085; France 759; United Kingdom 60.
Fire clay	40,580	37,811	434	Czechoslovakia 35,386; Austria 820; United Kingdom 581.
Kaolin	86,363	76,214	610	Czechoslovakia 38,034; East Germany 13,098; Greece 9,131.
Unspecified	12,030	7,887	(1)	Poland 5,086; Czechoslovakia 2,246; West Germany 496.
Products:				
Nonrefractory	13,814	8,805	--	Czechoslovakia 5,656; Italy 1,430; Austria 1,050.
Refractory including nonclay brick	36,152	29,254	54	West Germany 12,240; France 7,862; Austria 6,651.
Cryolite and chiolite	1,113	200	--	Denmark 199.
Diamond:				
Gem, not set or strung, value	$531,982	$514,616	--	Belgium-Luxembourg $233,469; Switzerland $158,359; West Germany $122,788.
Industrial, value, thousands	$2,988	$1,481	--	United Kingdom $607; Italy $511; West Germany $149.
Diatomite and other infusorial earth	421	544	149	Italy 179; Austria 124; West Germany 44.
Feldspar, fluorspar, related materials:				
Feldspar	1,154	1,094	--	France 1,088; Italy 4.
Fluorspar	--	1	--	All from Netherlands and Italy.
Unspecified	5,716	6,374	(1)	China 3,483; France 1,462; East Germany 974.
Fertilizer materials:				
Manufactured:				
Ammonia	93,562	96,142	(1)	Hungary 60,350; Romania 16,098; U.S.S.R. 11,138.
Nitrogenous	304,050	375,070	1,000	Hungary 168,456; U.S.S.R. 102,268; Czechoslovakia 50,279.
Phosphatic	42,636	30,268	--	Tunisia 25,299; Romania 4,969.
Potassic	461,798	444,941	--	East Germany 265,479; U.S.S.R. 179,390.
Unspecified and mixed	101,355	94,474	53,480	Romania 15,731; Canada 9,935; Hungary 7,326.
Graphite, natural	1,843	1,601	2	Czechoslovakia 883; Austria 395; West Germany 250.
Gypsum and plaster	33	29	2	West Germany 21; Italy 6.
Halogens:				
Bromine	9	3	--	Mainly from Netherlands.
Chlorine	16,422	7,333	--	Bulgaria 6,904; Italy 331; Austria 58.
Iodine	60	86	--	Japan 70; West Germany 9; France 7.
Lime	60	200	--	All from Austria.
Magnesium compounds:				
Magnesite	50,417	58,664	--	Greece 23,210; Turkey 16,446; China 12,750.
Other	26,012	31,506	(1)	Greece 17,880; North Korea 5,000; Norway 4,656.
Mica:				
Crude including splittings and waste	687	539	--	West Germany 319; India 70; Norway 58.
Worked including agglomerated splittings	132	129	(1)	Czechoslovakia 49; Austria 35; Belgium-Luxembourg 21.
Nitrates, crude	2	--	--	
Phosphates, crude, thousand tons	1,383	1,058	--	Togo 471; Morocco 252; U.S.S.R. 108.
Pigments, mineral: Iron oxides and hydroxides, processed	2,154	3,261	--	U.S.S.R. 1,147; Spain 698; United Kingdom 620.
Precious and semiprecious stones other than diamond:				
Natural, value	$103,902	$165,991	--	West Germany $134,026; Sri Lanka $15,827; Belgium-Luxembourg $15,518.
Synthetic, do	$358,420	$144,615	$6,139	Switzerland $51,876; Austria $31,148; Czechoslovakia $22,305.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pyrite, unroasted	68,413	49,232	--	U.S.S.R. 33,064; Cyprus 7,870; Albania 5,298.
Salt and brine	282,389	337,155	--	Romania 224,144; Tunisia 84,760; U.S.S.R. 19,282.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	211	1,104	--	Italy 371; Czechoslovakia 340; Austria 285.
Sodium carbonate, natural and manufactured	75,391	78,174	--	Romania 28,079; Bulgaria 21,926; East Germany 11,960.
Sodium hydroxide	272,958	199,351	--	France 62,273; Romania 52,741; West Germany 22,840.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,545	1,287	--	Italy 404; Austria 363; East Germany 280.
Worked	1,574	(1)	--	All from Italy.
Dolomite, chiefly refractory-grade	25	125	--	West Germany 120; Austria 5.
Gravel and crushed rock	44,493	11,728	--	Hungary 11,416; Belgium-Luxembourg 260; Czechoslovakia 34.
Limestone other than dimension	28,182	17,689	2	Hungary 14,999; Italy 2,688.
Quartz and quartzite	11,750	12,842	133	West Germany 7,890; Greece 4,698; Switzerland 62.
Sand other than metal-bearing	82,062	68,517	306	West Germany 28,373; Hungary 17,050; East Germany 16,924.
Sulfur:				
Elemental:				
Crude including native and byproduct	56,417	59,575	--	Poland 48,107; Mexico 5,472; West Germany 3,239.
Colloidal, precipitated, sublimed	506	479	--	West Germany 253; Poland 160; Italy 50.
Dioxide	529	337	--	All from Italy.
Sulfuric acid	63,913	107,915	(1)	Hungary 70,021; Greece 10,874; East Germany 8,000.
Other:				
Crude	14,728	19,182	1	Hungary 10,236; U.S.S.R. 4,200; Switzerland 2,758.
Slag and dross, not metal-bearing	439,950	255,144	--	Italy 244,841; Canada 4,861; Austria 4,735.
Oxides and hydroxides of barium, magnesium, strontium	64	76	--	East Germany 50; West Germany 21; Italy 2.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	19,855	24,790	--	Czechoslovakia 23,720; Austria 430; U.S.S.R. 405.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,615	1,418	807	Albania 600; Denmark 5; Netherlands 5.
Carbon: Carbon black	21,855	29,634	23	Italy 20,541; U.S.S.R. 3,831; France 2,635.
Coal:				
Anthracite	137,465	208,498	--	U.S.S.R. 207,008; West Germany 500.
Bituminous thousand tons	3,421	3,614	1,443	U.S.S.R. 1,633; Czechoslovakia 448; Poland 52.
Briquets of anthracite and bituminous coal	--	2,078	--	All from U.S.S.R.
Lignite including briquets	111,948	157,101	--	East Germany 97,495; U.S.S.R. 57,613.
Coke and semicoke	54,745	35,078	--	Italy 24,071; West Germany 6,493; United Kingdom 3,284.
Gas, natural million cubic feet	63	74	--	All from U.S.S.R.
Hydrogen, helium, rare gases	8	6	(1)	East Germany 2; Austria 1; Belgium-Luxembourg 1.
Peat including briquets and litter	9,722	8,198	--	Hungary 3,419; Poland 2,959; U.S.S.R. 1,713.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	81,215	69,364	--	U.S.S.R. 33,087; Iraq 10,403; Libya 7,379.
Refinery products:				
Liquefied petroleum gas do	974	1,122	(1)	Hungary 467; West Germany 322; Bulgaria 288.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Gasoline:				
Aviation 42-gallon barrels	44,135	32,503	--	Italy 26,816; Netherlands 5,687.
Motor ---------do----	37,015	1,275	170	Belgium-Luxembourg 451; Netherlands 357; United Kingdom 170.
Mineral jelly and wax --do----	19,604	20,674	(1)	West Germany 10,420; East Germany 3,368; Italy 921.
Kerosine and jet fuel ---do----	137,493	161,479	--	Czechoslovakia 56,924; Greece 55,560; Switzerland 45,469.
Distillate fuel oil -----do----	1,511,985	645,991	5,401	U.S.S.R. 555,658; Romania 80,605; Italy 3,708.
Lubricants ---------do----	669,238	753,193	7,301	Bulgaria 170,261; Italy 110,894; Romania 85,428.
Residual fuel oil thousand 42-gallon barrels	4,626	5,490	--	Bulgaria 1,462; Greece 1,411; U.S.S.R. 1,227.
Bitumen and other residues 42-gallon barrels	20,610	7,739	--	Austria 6,951; Albania 751.
Bituminous mixtures---do----	3,733	2,024	152	Netherlands 824; West Germany 358; Austria 297.
Petroleum coke ------do----	293,354	339,559	217,382	U.S.S.R. 51,854; Norway 41,888; Italy 17,386.
Tars and other crude chemicals derived from coal, gas, and petroleum ------	37,650	35,246	1	U.S.S.R. 9,856; Italy 7,077; West Germany 5,959.

NA Not available.
[1]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—During 1982, a new deposit of bauxite was discovered at Glavica near Loborike in the general area of the city of Pula, Istria, Croatia. Based on preliminary results, reserves of the Glavica deposit were set at 2 million tons of bauxite. One of the largest bauxite producers in the country, Niksic Bauxite Mine, completed its exploration program in the vicinity of its mining areas near Niksic, Montenegro. Newly discovered bauxite reserves put total reserves of the enterprise at 37 million tons or 37% of the country's proven reserves of bauxite.

The new facilities at Titograd and Mostar aluminum smelters were not operating at rated capacities because of the reduced supply of electrical power during 1982.

Copper.—The Veliki Krivelj Mine started production on December 24, 1982. The opencast mine and mill are located in the copper belt of Yugoslavia near the town of Bor, northeastern Serbia. Krivelj is a division of the largest copper producer in the country, Government-owned Rudarsko Topionicarski Bazen Bor.

The yearly output of Krivelj is expected to reach about 8 million tons of ore, about one-half of the present domestic output; between 25,000 and 30,000 tons of copper in concentrates, about 30% of present production; 240,000 tons of pyrite concentrates, about 50% of present domestic output; 250 tons of molybdenum concentrates, new production; and unspecified quantities of gold, silver, platinum-group metals, and selenium.

The output of the new mine is supposed to be used in the country, and imports of copper concentrates are expected to decrease.

Lead and Zinc.—The overall performance of the industry was below normal. Energy problems, decline in grade of ores, and social unrest in Kosovo, the area in which major production is located, adversely affected production of lead and zinc in Trepca, the largest producing facility in the country, and to some extent, production at mines and mills of other producers.

Nickel.—During 1982, Yugoslavia became a producer of nickel. A 16,000-ton-per-year ferronickel plant at Kavadarci, Macedonia, operated by Rudnici i Industrija za Nikel, Celik i Antimon, started production in the

spring. The nickel ore used at the Kavadarci plant came from the Rzanovo opencast mine nearby.

Construction of another ferronickel plant, rated at 12,000 tons per year of contained nickel, continued at Glogovac, Kosovo, Serbia, and the nearby Cikatovo Mine started production. Both facilities were operated by Feronikel, a subsidiary of Rudarsko Hemiski Kombinat Kosovo.

Reportedly, some of the ferronickel produced in Yugoslavia will be exported.

NONMETALS

Asbestos.—The expansion and modernization of the Stragari Mine, an old asbestos mine located west of Kragujevac in Serbia, continued during 1982. The mine and the new mill should have the capacity to produce and process about 1 million tons of ore per year. The Stragari Mine was a division of Rudarsko Energetsko Industrijski Kombinat Kolubara. Yugoslavia has been a net importer of asbestos in the past. When operational in 1984, the new facility at Stragari should lower dependence on imports but apparently will not eliminate it.

Barite.—Development of the barite mine at Mount Bobija in Serbia, rated at 150,000 tons of crude barite and 50,000 tons of concentrates annually, was underway during 1982. According to preliminary results of exploration, proven reserves totaled 1.7 million tons of barite. The grade was unreported.

Cement.—A restriction on investments imposed by the Government led to the decision to cut the number of planned cement plants in Serbia from three to one. At yearend no decision was made where this new plant should be located, although Kosjeric, Golubac, and Kriva Palanka were mentioned.

The cement plant at Kaknj, Bosna i Hercegovina (BiH), lost about 35,000 tons of cement production because of a shortage of fuel oil. The plant should start receiving natural gas from a pipeline supplying the steelworks at Zenica in 1983.

Feldspar.—After exploration was completed, a decision was made to start developing a mine and beneficiation plant near Bujanovac, close to the city of Vranje, Serbia. The new mine and plant are rated to process 37,000 tons per year of ore with a yield of 20,000 tons of feldspar, 8,000 tons of quartzite, and 3,000 tons of mica. The operating organization, Feldspat, is managed by the Nemetali Rudnici i Kopovi Nemetala enterprise of Vranje.

Fluorspar.—During 1982, the first commercial deposit of fluorspar in Yugoslavia, which was discovered at Ravnaja near Krupanj in western Serbia during 1981, was slated for development. The Geological Institute of Serbia conducted additional exploration during 1982 and reported proven reserves of ore at 600,000 tons. Construction of a 50,000-ton-per-year mine and mill, with a capacity to produce 15,000 tons of fluorspar concentrates, was scheduled to start in 1983 and completion was expected in 1984. The mine and mill should employ about 300 persons; the "26 of September," headquartered in Krupanj, Serbia, was designated as the operating enterprise.

Lime.—A new plant for production of about 500,000 tons per year of hydrated lime went onstream at Sirac near Daruvar, Croatia. The new plant, operated by a local enterprise, Kamen Industrija Gradevnog Materijala, was designed to use natural gas for fuel.

Magnesite.—An 85,000-ton-per-year sintered magnesite plant went onstream in the Magnohrom refractory plant in Kraljevo, Serbia. All of its production was to be used for production of refractory bricks.

Quartz Sand.—Development of a new quartz sand quarry was started at Krepoljin near Zagubica, Serbia. Most of its production will be used by foundries in Belgrade and Kikinda.

In the Vrsac area of Vojvodina, Serbia, planning was underway for development of a 500,000-ton-per-year quarry, which should produce quartz sand and feldspar from large deposits of sand discovered near the famous vineyards of Vrsac. According to results of laboratory investigations, the quartz sand size, 0.6 to 0.1 millimeter, is suitable for use in the glass, ceramics, and chemical industries. Feldspar at Vrsac can be compared with the best feldspar in Europe, and mica is of the muscovite type. The Vrsac deposit contains unspecified quantities of ilmenite and some titanium. The new facility should employ 183 workers when in full operation. The production startup date was not made public at yearend 1982.

At the Termit quartz sand mine and plant, located near Domzale, Slovenia, modernization was completed and the capacity of the mine and plant was increased from 400 to 1,000 tons per day. Proven reserves at Domzale could sustain present production for another 200 years.

Salt.—New deposits with reserves of 400 million tons of salt were discovered under Majevica, a mountain near Tuzla in BiH,

the only region in the country producing rock salt.

Stone.—The Granit Industria Granita Jablanica enterprise at Jablanica, BiH, announced plans to increase its production to 13,000 cubic meters of granite and 150,000 square meters of slabs by 1985.

Sulfur.—During the first days of December 1982, a new 160,000-ton-per-year sulfuric acid plant, operated by the Government-owned enterprise Cinkarna-Celje, started production at Celje, Republic of Slovenia. The sulfur was imported, but suppliers were not named. Investments totaled 790.7 million dinars.

MINERAL FUELS

The energy position in Yugoslavia was serious during 1982. Shortages were persistent, and many industrial facilities were forced to shut down because of the lack of energy. Closures usually lasted only a few days, but losses in revenue were important. Shortages of crude oil and petroleum products were so severe that the Government had to introduce rationing for gasoline and diesel fuel. Shortages of foreign exchange caused by interest payments on huge foreign debts limited the country's ability to purchase crude oil.

Coal.—The lack of foreign exchange for crude oil purchases made neglected domestic coal more attractive as a source of energy. In Istria, where the Rasa Mines were the largest producers of bituminous coal in the country, exploration was concentrated in the region of Koromacno, where about 13 million tons of coal reserves was proven. However, further exploration was required to find out whether safe mining was possible in the Karst area near the sea. The Pican Mine, the oldest in the region, was preparing to close sometime during 1983 because reserves were near exhaustion. The Pican Mine should be replaced by a new mine, Tupljak, in 1984. In addition, development work for another mine, the Ripenda Mine, started in 1982 and completion was planned for 1985.

In BiH, exploration for coal was successful during 1982. Near the locality of Maglaj, a deposit named Brezove Dane, with seams 9.5 meters thick and with reserves of about 22 million tons of brown coal, was discovered near a railroad and roads. At yearend no date for starting development was made public.

Near the village of Moscanica, about 20 kilometers from Zenica, BiH, exploration was completed during the year of review. Preliminary results indicated total reserves of 130 million tons of brown coal, of which 60 million tons is proven reserves. Initial planning was completed for development of a 1-million-ton-per-year underground mine. According to reports, if 10 billion dinars for investments in the new mine can be found, the new mine should be operational in 1987.

In Serbia, the largest producer of lignite among the states comprising Yugoslavia, a new opencast mine, Tamnava-Istocno Polje, started production. The new mine should produce about 11.5 million tons of lignite by 1985. In Serbia, the Nis region, reevaluation of old mines continued. The Jerma Mine near Babusnica and the Jankova Klisura Mine near Blace should be reactivated in the near future.

Coke.—During November 1982, a new 720,000-ton-per-year coke battery with 65 ovens started production at Rudarsko Metalurski Kombinat Zenica (RMK Zenica) in Zenica, BiH. RMK Zenica's coke capacity thus reached 1.44 million tons per year; the coke battery ended the second phase of modernization and expansion at RMK Zenica.

Petroleum.—At the beginning of 1982, INA and several foreign companies concluded agreements for joint ventures in exploration and possible production of crude oil and natural gas offshore in the Yugoslav part of the Adriatic. This was the first time that the centrally planned economic Government has permitted investment by foreign private capital in exploration for hydrocarbons in Yugoslavia. Three concessions were granted, each covering 4,000 square kilometers, and three organizations were formed by INA and its foreign partners. A concession near the island of Jabuka was operated by an organization consisting of Chevron USA, Inc., of the United States, with 70% of the 49% that the foreign companies are permitted by the Yugoslav law to invest in joint ventures in Yugoslavia. Azienda Generali Italiana Petroli S.p.A. (AGIP) of Italy provided the other 30%. At a concession near the island of Palagruza, Texaco Inc. of the United States and AGIP each provided 50% of their 49%. At the third concession, near the island of Mijet, the newly created organization consisted of AGIP providing 50% of the 49%, Texaco with 30%, and Empresa Nacional del Petróleo S.A. of Spain with 20%. During 1982, all three joint ventures were behind schedule, but the first exploration results indicated possible discovery of oil or natural gas.

Late in the year a 50,000-barrel-per-day

petroleum refinery went onstream near Skopje, Macedonia. Construction had started in 1979 with U.S.S.R. equipment. Crude oil was delivered by rail from the Port of Thessaloniki in Greece.

The Dow Chemical Co. of the United States withdrew from Dow-INA (DINA), the joint venture company with INA, because of market conditions. DINA was to have invested about $1.2 billion in construction and later operated the petrochemical plant at Islan Krk on the Adriatic coast of Yugoslavia. The arrangement called for Yugoslav participation of 51%, with the rest from Dow Chemical. The venture had been the largest-ever U.S. private participation in Yugoslavia. INA then announced that it would proceed alone in efforts to complete the plant at Krk.

Uranium.—Exploration for uranium was intensive in the region of Bukulja Mountain and the village of Belanovica in Serbia. However, results were not made public by yearend.

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[1]Physical scientist, Division of Foreign Data.

[2]Dinar (din) is not convertible currency. A meaningful conversion to U.S. currency is impractical. At yearend, the official exchange rate was 45din = US$1.00.

The Mineral Industry of Zaire

By Ben A. Kornhauser[1]

In 1982, Zaire, the world's largest cobalt producer, cut back cobalt production by 60% in response to poor demand although copper output remained the same. Cement output declined, but crude oil production was up 9%. Payments of about $1 billion on a foreign debt of about $5 billion were expected to consume over 60% of export earnings. The debt service obligations were estimated at more than 38% of exports. The Government derived about 15% of its budget revenues from taxes on La Générale des Carrières et des Mines du Zaire (Gécamines). The Zairian economy had been facing a serious economic crisis for several years owing to factors such as the drop in prices for copper, cobalt, industrial diamonds, and coffee; a drop in agricultural output; and a large budgetary deficit. In 1982, the resulting decreased export earnings hindered servicing Zaire's heavy debt burden.

In July, the European Economic Community (EEC) approved a loan of $40 million by its European Development Fund to Gécamines, for the purchase of mining capital equipment such as excavators and cranes, spare parts, metallurgical facilities, and track and commercial vehicles. A loan condition required part of Gécamines' hard currency income to be reinvested in the enterprise in an amount at least equal to the taxes levied by the Government until the production capacity reached 475,000 tons per year of copper and 15,000 tons per year of cobalt.[2] Another EEC condition was that it be informed of all agreements concluded between Gécamines and the Governments' mineral-marketing arm, Société Zairoise de Commercialisation des Minerais (Sozacom). To improve the effectiveness of Gécamines and, in response to the loan requirements, Zaire redefined the relationship between Gécamines and Sozacom. Gécamines' top management also streamlined operations and installed new accounting controls. The revised agreement between Gécamines and Sozacom restored to Gécamines the ownership and exclusive sales rights for its production whose marketing had been handled previously by Sozacom. Sozacom became an agent that only negotiated contracts for Gécamines. The revised relationship and reorganization were expected to cut overhead costs and to reduce the effects of falling prices and earnings for most nonferrous metals.

On October 18, the Swiss Aluminium Co. (Alusuisse), presented to the Government and seven private companies from Europe and Japan a detailed feasibility study for a 210,000-ton-per-year aluminum smelter in Zaire. The projected cost was estimated at $900 million, of which one-third was to be supplied by the consortium and the balance from other sources. The smelter was to be sited by the estuary of the Zaire River, about 160 kilometers from the new Inga-Shaba hydroelectric complex, which would supply power at a very reasonable cost. A decision to proceed with the project had been deferred since Alusuisse's current policy was to concentrate on fabrication and processing instead of primary production and taking an equity position in the smelter was counter to its goals.[3]

PRODUCTION AND TRADE

Sozacom and the China National Metals & Mineral Import & Export Corp. concluded an agreement under which Sozacom would provide China in 1983 with 20,000 tons of blister copper, 300 tons of granules and cathode fragments, and 5,000 tons of zinc at an estimated $30 million. The contract was the first copper transaction of this size between the two countries.[4] Because of the weak demand for Zaire's principal mineral exports of copper, cobalt, and diamond, the International Monetary Fund (IMF) granted temporary financial relief with a special drawing rights loan equal to $109 million. Under a 3-year IMF rescue program of $927 million, Zaire's drawings were still frozen because of failure to maintain debt service payments.[5]

The bulk of mineral products were exported through a lengthy network of road, rail, and river transport to the Port of Matadi. Zaire also reportedly exported through Tanzania via Kigoma, the port on Lake Tanganyika, and the terminus of the Tanzanian railway system. Shipments of 4,000 tons per month each of copper and zinc crossed the lake from Kalemie in Zaire to Kigoma, and then were transported by rail to Dar Es Salaam for shipment.[6]

Table 1.—Zaire: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Cadmium, smelter	186	212	168	230	[2]282
Cobalt:					
Mine output, metal content[e]	[r]13,400	[r]15,400	16,000	13,600	[2]5,800
Refined	[r]13,100	[r]14,000	14,400	11,100	[2]5,608
Columbium-tantalum concentrate	18	32	92	75	[2]80
Copper:					
Mine output, metal content	423,800	399,584	460,000	505,000	[2]503,000
Blister and leach cathodes	390,700	370,100	426,000	468,000	[2]467,000
Refined	102,797	103,214	144,000	151,000	[2]175,000
Gold[3] troy ounces	[r]76,197	[r]73,368	40,864	64,430	[2]62,233
Manganese ore and concentrate	--	--	16,586	[e]10,000	4,000
Monazite concentrate, gross weight	77	90	51	35	[2]32
Silver thousand troy ounces	4,391	[r]2,954	2,733	2,580	[2]1,750
Tin:					
Mine output, metal content	4,390	3,879	3,000	2,468	[2]2,240
Smelter, primary	496	458	216	450	[2]353
Tungsten, mine output, metal content	[r]275	[r]210	134	89	[2]74
Zinc:					
Mine output, metal content	[r]82,800	[r]73,000	67,000	63,300	[2]65,000
Metal, primary, electrolytic	43,500	43,508	51,400	65,400	[2]64,397
NONMETALS					
Cement, hydraulic thousand tons	472	450	443	408	400
Diamond:					
Gem[e] thousand carats	640	294	345	450	450
Industrial[e] do.	10,603	8,440	9,890	8,550	8,550
Total do.	11,243	8,734	10,235	9,000	9,000
Lime	[e]109,400	[e]115,300	113,600	123,500	120,000
Sulfur:					
Byproduct of metallurgy, S content of sulfuric acid produced	[e]26,700	[e]25,700	24,800	25,000	25,000
Sulfuric acid, gross weight	137,800	135,100	142,700	142,900	140,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	215	225	287	240	240
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	6,604	[r]7,614	6,643	7,669	[2]8,385
Refinery products:					
Gasoline do.	279	483	NA	NA	NA
Kerosine and jet fuel do.	231	319	NA	NA	NA
Distillate fuel oil do.	289	682	NA	NA	NA

See footnotes at end of table.

Table 1.—Zaire: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Residual fuel oil thousand 42-gallon barrels	529	1,252	NA	NA	NA
Liquefied petroleum gas do	--	21	NA	NA	NA
Refinery fuel and losses do	125	[4]173	NA	NA	NA
Total do	1,453	2,930	NA	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 16, 1983.
[2]Reported figure.
[3]Excludes gold recovered from blister copper.
[4]Reportedly includes 75,000 barrels of unfinished oil shipped elsewhere for future refining.

Table 2.—Zaire: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	46	--		
Cadmium: Metal including alloys, all forms	118	187	30	Belgium-Luxembourg 125; West Germany 32.
Chromium: Metal including alloys, all forms	--	4	--	All to Spain.
Cobalt: Metal including alloys, all forms	3,973	2,530	1,894	France 213; Japan 210; West Germany 172.
Columbium and tantalum: Ore and concentrate	53	72	57	Sweden 12; Japan 3.
Copper:				
Ore and concentrate	107,095	102,843	--	Japan 102,839; France 4.
Matte and speiss including cement copper	--	374	--	All to Greece.
Ash and residue containing copper	--	256	--	All to West Germany.
Metal including alloys:				
Scrap	191	1,086	--	Greece 568; West Germany 334; Belgium-Luxembourg 93.
Unwrought[2]	426,891	406,319	24,688	Belgium-Luxembourg 289,533; Italy 31,245; West Germany 22,226.
Semimanufactures	503	1	--	All to Switzerland.
Indium: Metal including alloys, all forms	--	148	148	
Iron and steel: Metal:				
Scrap	20	3,760	--	Egypt 3,749; Belgium-Luxembourg 11.
Ferroalloys, unspecified	--	24	--	All to France.
Semimanufactures:				
Bars, rods, angles, shapes, sections	15	--	--	
Universals, plates, sheets	--	5	--	All to Canada.
Lead: Ore and concentrate	--	91	--	All to France.
Manganese: Ore and concentrate, metallurgical-grade	41,676	12,858	--	Spain 6,819; Belgium-Luxembourg 5,989; Italy 50.
Nickel: Metal including alloys:				
Scrap	--	57	--	All to Belgium-Luxembourg.
Semimanufactures	1	--		
Silver:				
Ore and concentrate[3] value, thousands	$642	$211	--	All to Spain.
Metal, including alloys, unwrought and partly wrought do	$77	$48	([4])	Mainly to Belgium-Luxembourg.
Tin:				
Ore and concentrate	[r]2,740	2,610	--	Netherlands 2,271; Spain 339.
Oxides	446	189	--	Belgium-Luxembourg 179; West Germany 10.

See footnotes at end of table.

Table 2.—Zaire: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Tungsten: Ore and concentrate	157	75	74	Austria 1.
Uranium and/or thorium: Ore and concentrate, value, thousands	--	$34	--	All to France.
Zinc: Metal including alloys, unwrought	[2]16,100	69,900	28,540	Greece 4,975; Egypt 2,000; France 1,524; Italy 700; Thailand 499.
Other:				
Ores and concentrates	61	36	--	Japan 30; West Germany 6.
Ashes and residues	76	215	--	West Germany 140; Belgium-Luxembourg 75.
Base metals including alloys, all forms	[5]200	47	--	Switzerland 18; Yugoslavia 17; Taiwan 12.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc, value, thousands	$22	--		
Dust and powder of precious and semiprecious stones, including diamond, carats	([6])	865,194	454,964	Japan 410,230.
Diamond:				
Gem, not set or strung, value, thousands	$101,481	$36,547	$78	United Kingdom $20,040; Belgium-Luxembourg $13,648; Netherlands $2,036.
Industrial, do	$11,271	[7]$30,832	$10,546	Belgium-Luxembourg $18,260; West Germany $1,374.
Gypsum and plaster	24	--		
Precious and semiprecious stones other than diamond:				
Natural, value, thousands	$744	$977	$346	Switzerland $449; Hong Kong $63; West Germany $52.
Synthetic, do	$3	$11	--	All to Thailand.
Stone, sand and gravel:				
Dimension stone, worked, do	--	$12	$9	Senegal $2; France $1.
Quartz and quartzite	8	--		
Talc, steatite, soapstone, pyrophyllite, value, thousands	([8])	$3	$3	
Other: Crude, do	[r]$106	$2	$2	
MINERAL FUELS AND RELATED MATERIALS				
Petroleum and refinery products:				
Crude, 42-gallon barrels	9,594	6,620	6,620	
Refinery products: Residual fuel oil, do	--	252,900	--	France 121,691; Spain 66,600; Netherlands 64,609.

[r]Revised.

[1]Owing to the lack of available official trade data published by Zaire, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from various sources which include United Nations information and data published by the trading partner countries. Unless otherwise specified, data are compiled from trade statistics of individual trading partners.

[2]World Metal Statistics, published by the World Bureau of Metal Statistics, London, United Kingdom, April 1982.

[3]May include waste and sweepings.

[4]Less than 1/2 unit.

[5]Excludes exports to Australia valued at $157,000.

[6]Value is $1,521,000.

[7]Exludes 1,500 carats exported to Canada.

[8]Quantity is 21 tons.

Table 3.—Zaire: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	77	--		
Metal including alloys, semimanufactures	801	621	14	Hong Kong 254; Belgium-Luxembourg 248; Netherlands 47.
Beryllium: Metal including alloys, all forms value, thousands	--	$1	--	All from Belgium-Luxembourg.
Cadmium: Metal including alloys, all forms	40	--		
Chromium: Oxides and hydroxides value, thousands	--	$1	--	All from Belgium-Luxembourg.
Copper: Metal including alloys, semimanufactures	31	133	59	Belgium-Luxembourg 53; Italy 13; Switzerland 4.
Iron and steel: Metal:				
Scrap	--	1	--	All from Belgium-Luxembourg.
Pig iron, cast iron, related materials	84	(2)		
Ferroalloys, unspecified	299	56	--	West Germany 33; France 23.
Steel, primary forms	3,000	268	--	France 249; Italy 19.
Semimanufactures:				
Bars, rods, angles, shapes, sections	13,400	11,439	63	Belgium-Luxembourg 7,923; West Germany 1,366.
Universals, plates, sheets	25,582	23,511	288	Belgium-Luxembourg 10,846; Japan 9,231.
Hoop and strip	1,452	729	--	Belgium-Luxembourg 435; Italy 149; West Germany 133.
Rails and accessories	2,632	397	(3)	France 372.
Wire	919	678	(3)	Belgium-Luxembourg 629; Hong Kong 18; West Germany 17.
Tubes, pipes, fittings	12,715	8,529	525	Japan 3,241; Belgium-Luxembourg 702; France 1,410.
Castings and forgings, rough	3,253	737	--	Italy 700; France 21; Belgium-Luxembourg 15.
Lead:				
Oxides	112	103	--	Belgium-Luxembourg 94; France 9.
Metal including alloys:				
Unwrought	453	225	--	Belgium-Luxembourg 224; West Germany 1.
Semimanufactures	515	61	--	All from Belgium-Luxembourg.
Magnesium: Metal including alloys, unwrought	--	2	--	All from Italy.
Manganese: Ore and concentrate, metallurgical-grade	444	2	--	All from France.
Mercury 76-pound flasks	29	--		
Metalloids: Unspecified	169	418	--	France 415; West Germany 3.
Nickel:				
Matte and speiss	10	--		
Metal including alloys:				
Unwrought	12	1	--	All from Belgium-Luxembourg.
Semimanufactures value thousands	--	$12	--	All from Switzerland.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified do	--	$2	--	All from Belgium-Luxembourg.
Silver: Metal including alloys, unwrought and partly wrought do	$695	$329	--	Belgium-Luxembourg $204; Switzerland $121.
Tin: Metal including alloys:				
Unwrought	--	72	--	Mainly from United Kingdom.
Semimanufactures	--	1	--	All from Belgium-Luxembourg.
All forms	1	--		
Titanium: Oxides	18	62	--	Belgium-Luxembourg 28; West Germany 22; Italy 12.
Zinc:				
Oxides	10	14	--	Belgium-Luxembourg 10; France 2; Italy 2.
Blue powder	--	2	2	
Metal including alloys, semimanufactures	77	21	--	Belgium-Luxembourg 18; Italy 3.
Other:				
Ores and concentrates	1	--		
Oxides and hydroxides	15	--		
Pyrophoric alloys	--	6	--	All from Japan.
Base metals including alloys, all forms	28	(8)		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	3	(9)		

See footnotes at end of table.

Table 3.—Zaire: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Abrasives, n.e.s. —Continued				
Grinding and polishing wheels and stones	72	49	([10])	Belgium-Luxembourg 19; Italy 14; Japan 7; West Germany 4.
Asbestos, crude	1,135	185	--	Italy 180; Belgium-Luxembourg 3; France 2.
Barite and witherite	3,088	18	--	All from United Kingdom.
Boron materials: Oxides and acids	1	--		
Cement	1,807	3,092	27	Belgium-Luxembourg 2,872; France 153; West Germany 33.
Chalk	147	61	--	Italy 37; France 12; Belgium-Luxembourg 7.
Clays and clay products:				
Crude:				
Bentonite	666	--		
Unspecified	400	299	1	Netherlands 200; France 95.
Products:				
Nonrefractory	[11]1,672	1,729	--	Spain 847; Italy 620; Belgium-Luxembourg 123.
Refractory including nonclay brick	707	1,694	1	United Kingdom 401; Italy 399; West Germany 344.
Diamond:				
Gem, not set or strung value, thousands	$1,570	$244	--	Belgium-Luxembourg $234; Switzerland $10.
Industrial do	$1	$3	--	All from United Kingdom.
Diatomite and other infusorial earth	230	86	--	All from France.
Feldspar, fluorspar, related materials:				
Feldspar	--	47	--	All from Spain.
Unspecified	315	--		
Fertilizer materials: Manufactured:				
Ammonia	195	118	--	Belgium-Luxembourg 103; Netherlands 10; West Germany 5.
Nitrogenous	20,210	7,534	--	France 4,029; West Germany 1,621; Japan 1,072.
Phosphatic	539	105	--	All from Belgium-Luxembourg.
Potassic	1,032	1,591	--	Belgium-Luxembourg 1,141; West Germany 450.
Unspecified and mixed	6,971	13,976	--	Belgium-Luxembourg 8,121; West Germany 4,782; Japan 1,041.
Gypsum and plaster	10,156	7,512	--	Morocco 5,000; Spain 2,500; Belgium-Luxembourg 6.
Halogens: Unspecified	--	[12]1	1	
Lime	1,921	551	--	Belgium-Luxembourg 491; United Kingdom 40; Netherlands 20.
Magnesium compounds: Magnesite	[13]4	56	--	Austria 55; Belgium-Luxembourg 1.
Mica:				
Crude including splittings and waste	5	13	--	Netherlands 11; Belgium-Luxembourg 2.
Worked including agglomerated splittings value, thousands	--	$1	--	All from Belgium-Luxembourg.
Phosphates, crude	100	460	--	Do.
Pigments, mineral:				
Natural, crude kilograms	--	45	45	
Iron oxides and hydroxides, processed	78	78	--	West Germany 53; Spain 15; Belgium-Luxembourg 8.
Precious and semiprecious stones other than diamond: Natural value, thousands	$25	--		
Salt and brine	2,282	5,598	--	Canada 5,333; Belgium-Luxembourg 146; Spain 52.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	69	16	([3])	Belgium-Luxembourg 14; France 2.
Sodium carbonate, natural and manufactured	1,846	2,481	--	France 2,124; West Germany 295; United Kingdom 39.
Sodium hydroxide	5,731	6,226	18	Belgium-Luxembourg 4,149; West Germany 1,729; United Kingdom 138.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	68	50	--	Italy 36; Belgium-Luxembourg 11; Portugal 3.
Worked	116	[14]2	--	Portugal 2.
Dolomite, chiefly refractory-grade	22	50	--	United Kingdom 40; France 10.
Gravel and crushed rock	16	26	--	West Germany 16; Belgium-Luxembourg 4.
Quartz and quartzite	--	7	--	All from Belgium-Luxembourg.
Sand other than metal-bearing	--	148	140	Belgium-Luxembourg 5; Netherlands 3.

See footnotes at end of table.

Table 3.—Zaire: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	345	122	--	Belgium-Luxembourg 94; West Germany 19; France 9.
Colloidal, precipitated, sublimed	--	6	--	West Germany 5; Italy 1.
Dioxide	--	342	56	Belgium-Luxembourg 198; Netherlands 73; West Germany 11.
Sulfuric acid	326	--		
Talc, steatite, soapstone, pyrophyllite	21	138	--	Belgium-Luxembourg 71; France 55; West Germany 7; Italy 5.
Other:				
Crude	5,567	206	([15])	West Germany 200; Belgium-Luxembourg 6.
Slag and dross, not metal-bearing	15	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	170	--	Belgium-Luxembourg 105; Italy 51; United Kingdom 13.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	133	392	--	Spain 360; Belgium-Luxembourg 32.
Carbon: Carbon black	660	904	1	West Germany 893; Italy 9.
Coal:				
Anthracite and bituminous	10	150	--	All from Belgium-Luxembourg.
Briquets of anthracite and bituminous coal	--	21	--	Do.
Coke and semicoke	51	215	--	Belgium-Luxembourg 200; Portugal 15.
Hydrogen, helium, rare gases	12	--		
Petroleum and refinery products:				
Crude, 42-gallon barrels	NA	[16]356,436	--	Saudi Arabia 356,436.
Refinery products:				
Liquefied petroleum gas do	77	23	([17])	Belgium-Luxembourg 23.
Gasoline: Motor do	377,000	184,992	--	Canada 148,000; United Kingdom 25,415; France 8,075.
Mineral jelly and wax do	3,534	3,502	519	West Germany 2,038; France 354; Netherlands 331.
Kerosine and jet fuel do	991,000	139,206	--	France 96,542; United Kingdom 38,812; Greece 3,836.
Distillate fuel oil do	1,436,000	918,116	--	Canada 660,000; Belgium-Luxembourg 131,572.
Lubricants do	[18]158,000	117,121	2,692	France 67,998; Belgium-Luxembourg 7,959.
Nonlubricating oils do	750	2,034	2,034	
Bitumen and other residues do	152,361	545	261	France 242; Belgium-Luxembourg 42.
Bituminous mixtures do	3,691	7,781	([19])	Spain 7,030; Belgium-Luxembourg 673.
Petroleum coke do	5,929	6,418	6,418	
Tars and other crude chemicals derived from coal, gas, and petroleum	23	19		Netherlands 7; United Kingdom 7; Belgium-Luxembourg 5.

NA Not available.

[1]Owing to the lack of available official trade data published by Zaire, this table should not be taken as a complete presentation of mineral imports of this country. These data have been compiled from various sources which include United Nations information and data published by the trading partner countries. Unless otherwise specified, data are compiled from trade statistics of individual trading partners.

[2]Reported value of $1,000 from Switzerland.

[3]Less than 1/2 unit.

[4]Excludes exports from Japan valued at $3,000.

[5]Excludes exports from Japan valued at $1,000.

[6]Excludes exports from West Germany valued at $2,000 and Japan, $1,000.

[7]Excludes exports from Belgium-Luxembourg valued at $7,000; West Germany, $3,000; Italy, $1,000; and the Netherlands, $1,000.

[8]Exports from Japan valued at $6,000.

[9]Exports from Belgium-Luxembourg valued at $2,000.

[10]Value only reported at $765.

[11]Excludes portion of exports from Japan valued at $4,000.

[12]Excludes exports from West Germany valued at $1,000 and the Netherlands, $2,000.

[13]Excludes exports from Canada valued at $9,000.

[14]Excludes exports from Belgium-Luxembourg valued at $3,000.

[15]Value reported at $2,270.

[16]Excludes exports from Belgium-Luxembourg valued at $1,000.

[17]Value reported at $12,385.

[18]Excludes exports from Japan valued at $62,000.

[19]Value reported at $6,557.

COMMODITY REVIEW

METALS

Copper, Cobalt, Zinc, and Associated Metals.—Cobalt production in 1982 was estimated at 5,600 tons. About 20,000 tons of cobalt were held in stock, mostly as collateral on loans. In order to regain market share from long-term, large tonnage customers, Sozacom and its U.S. sales agent, Afrimet Indussa Corp., priced cobalt very competitively, causing the price to drop to about $6 per pound in the latter half of the year.

Gécamines' and Sodimiza's copper production for 1982 were essentially the same as that of 1981. Copper exports were expected to be greater because of sales of unrefined copper directly to the customer instead of shipments of unrefined copper first to Belgium for refining. An upturn in copper demand in 1983 plus stable power from the Inga-Shaba complex were expected to stimulate completion of Gécamines' flash smelter and extensions to the Luilu refinery. The depressed world economy apparently stalled plans to restart operations of the Société Minière de Tenke-Fungurume.

Primary electrolytic zinc metal production in 1982 was estimated at 64,400 tons compared with 65,400 tons in 1981.

Table 4.—Zaire: Details of 1981 copper production, by area

(Thousand metric tons)

Area	Ore[1]	Concentrate	Copper content
MINE			
Western Group:			
Open pits	8,480	--	422.2
Kamoto underground	2,715	--	113.5
Central Group:			
Open pits	1,228	--	42.7
Kambove underground	1,142	--	31.4
Kipushi underground[2]	1,358	--	52.3
Sodimiza underground[e]	1,305	--	36.0
Total	16,228	--	698.1
CONCENTRATOR			
Western Group:			
Mutoshi	2,250	47	14.4
Kamoto	5,420	579	214.0
Dima	780	139	33.8
Kolwezi	4,120	694	161.8
Central Group:			
Kambove	1,404	78	34.6
Kakanda	552	79	18.1
Kipushi[2]	1,342	148	43.3
Sodimiza[e]	1,305	93	34.3
Total	17,173	1,857	[3]554.3

[e]Estimated.
[1]Gross weight.
[2]The Kipushi ore also contained 95,100 tons of zinc and the Kipushi concentrator produced 112,000 tons of zinc concentrate containing 63,300 tons of zinc.
[3]The recovered copper production of Gécamines for 1981 was 480,400 tons.

Source: Gécamines, 1981 Annual Report.

Manganese.—The manganese production by Société Minière de Kisenge (SMK), a state-owned company, dropped to only 4,000 tons in 1982 from 10,000 tons in 1981. This drop was attributed to the stockpile overhang of 500,000 tons of crushed and 700,000 tons of uncrushed carbonate ore. The relative unavailability of freight cars that were

used for higher priced materials and the poor state of the Dilolo-Lobito Railway prevented export of these large stocks. SMK was exploring processing the manganese ore into upgraded, less bulky, and more income-producing products to permit shipment of higher priced material whenever possible.

Tin, Tungsten, and Columbium-Tantalum.—A new facility in Zaire provided the United States with about 8,000 pounds of columbium ore.

NONMETALS

Cement.—The country's No. 2 cement plant Cimenterie Nationale (Cinat), shut down temporarily in 1982 because of fuel shortages. Cinat was producing only 10,000 tons of cement per year from an annual production capacity of 300,000 tons.

Diamond.—Since Zaire withdrew from its marketing contract with the De Beers' Central Selling Organization, the principal buyers of Zaire diamonds were the Industrial Diamond Co. of London, the United Kingdom, and two Dutch companies, Caddri Spri and Glasol N.V. These three companies were involved with Sozacom in establishing a Zairian diamond-cutting operation that was estimated to cost $36 million and employ 700 people.

Existing legislation was modified by a November 5, 1982, ordinance to permit holding gold or diamonds won by artisanal workers anywhere within the country without violating any law. Possession of such materials still was prohibited within mining concessions and within exclusive prospecting and proving zones granted as concessions by the Government to individuals and companies. Exporting these goods, except through regulated channels, remained an infraction of the law. Firms were required to be licensed to act as a broker for other than Société Minière de Bakwanga (MIBA) diamonds. By permitting freer ownership and trade between panners of alluvial deposits and authorized traders, prospectors were expected to receive better prices and illegal diamond sales were expected to decrease or disappear.

MIBA was having a new bucket dredge made in Malaysia and Singapore. The dredge would have the capacity to dredge 1 million cubic meters of diamondiferous alluvial deposits annually and was expected to stop MIBA's declining production. The dredge was being financed internally and was expected to be in service by July 1983.

MINERAL FUELS

Petroleum.—Crude oil production from Zaire's coastal zone rose from an average 20,471 barrels per day in 1981 to an average of 23,000 barrels per day or 8,385,000 barrels in 1982. Three of the four wells drilled in the 1982 oil exploration program were unproductive. The fourth and last well was drilled to a depth of 2,760 meters and showed positive signs that warranted drilling one or more additional wells to evaluate its commercial feasibility.

Under oil law 81-013 of April 2, 1981, the rights of the Zaire Gulf Oil Co. were renegotiated to give Zaire 20% participation in the company and 76% of the oil production.

Uranium.—An agreement on the exploitation and mining of uranium in the Gécamines' concession was signed by representatives of Gécamines, and the French Government agencies, Compagnie Générale des Matières Nucléaires, and Commissariat à l'Energie Atomique. The protocol was expected to help in industrializing Zaire and in training Zairians in the field.

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[1]Physical scientist, Division of Foreign Data.
[2]Mining Magazine. V. 147, No. 3, September 1982, p. 175.
[3]Metal Bulletin. No. 6730, Oct. 15, 1982, p. 17.
[4]———. No. 6758, Jan. 28, 1982, p. 9.
[5]London West Africa. No. 3373, Mar. 29, 1982, p. 879.
[6]Mining Magazine. V. 147, No. 4, October 1982, p. 271.

The Mineral Industry of Zambia

By Thomas O. Glover[1]

The mineral industry of Zambia provided more than 95% of the country's foreign exchange credit and supported its position as the world's fifth largest producer of copper and the second largest producer, in terms of mine output, of cobalt. Transportation costs for delivering copper and cobalt metals to world markets continued to be a large part of the total cost for Zambian copper and cobalt. Zambia, a landlocked country, must rely on rail transportation through the Republic of South Africa and other East African countries in order to export their copper and cobalt. Zambia utilizes the ports of Dar es Salaam, Tanzania, Maputo, Mozambique, and Richards Bay, Republic of South Africa. In response to an acute shortage of railway cars in 1982, Zambia was to start manufacturing its own railway cars to alleviate the problem. Spare parts and locomotive engines were purchased from China, who built the TAZARA Railroad. Plans were underway to purchase 14 new locomotives from the Federal Republic of Germany.

Zambia finalized negotiations with a consortium of western bankers that secured the renewal of their annual oil operations budget of approximately $175 million.[2]

The mining sector dominates the economy of Zambia, contributing a high percentage to the country's gross domestic product and the bulk of foreign exchange earnings. Zambia's economy, during 1982, continued to be recessionary. Beset by depressed world prices for copper and cobalt and high imported crude oil prices, the country's balance of payments deteriorated. The resulting shortage of foreign exchange had adverse effects in nearly all productive sectors of the economy, which experienced shortages of raw materials and other inputs. Reduced Government revenues contributed to budget deficits, that in turn contributed to inflationary pressures, increased foreign debt, and a decline in access to international commercial credit. Zambia's International Monetary Fund loan of $856 million in 1981 was suspended early in 1982 when the country was unable to meet certain conditions of the loan. Approximately $385 million of the $856 million loan was drawn prior to the suspension for use in replacing declining copper revenues.

The Commonwealth Development Corp. agreed to lend Zambia Consolidated Copper Mines (ZCCM) approximately $26 million to extend the tailings leach plant at Chingola division.

Zambia's two major mining companies, Nchanga Consolidated Copper Mines Ltd. and Roan Consolidated Mines were merged to form ZCCM in March. The merger made ZCCM the world's second largest copper company after Corporación Nacional del Cobre de Chile (CODELCO-Chile).

PRODUCTION AND TRADE

Zambia's production of metallic copper increased 4% during 1982, while the production of cobalt refined metal decreased 5%. Copper ore milled in 1982 increased 26% over that of 1981; however, the grade of the ore decreased from 2.2% in 1981 to 1.8% in 1982. ZCCM production came from 10 underground and 7 open cast sources at the company's seven producing divisions. During 1982, detailed design and site preparation plans were completed for the new Chambishi sulfuric acid plant. The new plant will treat all of the effluent gases from the leach plant roaster and will have a production capacity of approximately 75,000 tons of acid per year.

The lack of foreign exchange and the problems associated with it caused delays in ordering spare parts and new equipment for mining operations. Future production problems are expected because of the shortage of foreign exchange. Seventy-six percent of the copper exported during 1982 went to six major countries. The countries were, in order of importance, Japan, France, Italy, the Federal Republic of Germany, India, and the United Kingdom. The value of exported copper in 1982 was $757 million compared with $1,002 million in 1981.

Table 1.—Zambia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
METALS					
Cadmium metal	--	--	1	--	--
Cobalt:					
Mine output, metal content of concentrate	3,741	4,280	4,400	4,000	[e]3,800
Metal	2,063	3,176	3,310	2,570	2,446
Copper:					
Mine output:					
Total content of ore	766,561	723,978	760,200	697,943	720,290
Recoverable content of concentrate	642,972	588,334	595,757	588,000	530,000
Metal:					
Blister and anodes, Cu content[2]	653,856	582,082	609,935	560,565	584,680
Refined	627,744	561,940	607,592	560,446	584,613
Gold[3] troy ounces	8,457	7,933	10,576	10,545	13,439
Iron ore: Magnetite	41	50	378	1,434	797
Lead:					
Mine output, metal content of ore	15,853	17,640	[e]13,900	17,152	21,240
Metal, smelter and refined[4]	12,878	12,758	10,047	9,866	14,645
Selenium, elemental kilograms	30,881	19,980	22,704	20,000	23,234
Silver[5] thousand troy ounces	1,069	914	764	714	887
Tin concentrate, gross weight	(6)	1	(6)	(6)	10
Zinc:					
Mine output, metal content of ore	50,000	46,600	31,985	40,557	51,967
Metal, smelter plus electrolytic	42,462	38,213	32,686	33,298	39,186
NONMETALS					
Cement, hydraulic thousand tons	123	200	160	144	154
Clays, building, unspecified do.	NA	[r]72	8,392	28	27
Feldspar	334	500	475	452	362
Fluorspar	76	--	--	--	--
Gem stones:					
Amethyst kilograms	9,487	4,860	3,360	45,222	23,476
Emerald do.	429	[e]400	--	--	--
Gypsum	1,726	138	--	--	--
Lime, hydraulic and quicklime thousand tons	[e]250	250	182	201	185
Nitrogen: N content of ammonia	[e]20,000	[e]20,000	19,600	17,800	27,200
Pyrite, gross weight	2,515	3,002	2,600	--	--
Sand, construction	NA	[s]194,955	[s]196,797	276,522	365,437
Stone:					
Limestone thousand tons	227	416	515	499	427
Phyllite do.	10	7	8	4	9
Miscellaneous (building)	NA	[s]216,136	[s]335,147	302,401	4,338,653
Sulfur, elemental basis (produced as sulfuric acid):					
From pyrite	991	1,234	1,122	5	1,239
From copper ores	108,784	73,903	91,233	90,154	83,870
Total	109,775	75,137	92,355	90,159	85,109
Talc	[e]100	--	258	921	271

See footnotes at end of table.

Table 1.—Zambia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[p]
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	1,169	599	569	527	604
Petroleum refinery products:[e]					
Gasoline thousand 42-gallon barrels	1,658	1,700	1,095	NA	NA
Jet fuel do.	360	400	365	NA	NA
Kerosine do.	200	220	365	NA	NA
Distillate fuel oil do.	2,686	2,830	2,190	NA	NA
Residual fuel oil do.	1,399	1,400	2,190	NA	NA
Other do.	152	110	--	NA	NA
Refinery fuel and losses do.	194	128	365	NA	NA
Total do.	6,649	6,788	6,570	NA	NA

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through June 15, 1983.
[2]Includes leach cathodes.
[3]Primarily contained in blister copper and refinery muds.
[4]For all practical purposes, Zambian output of crude lead and refined lead are regarded as equal; the latter is reported, and inasmuch as no impure lead is marketable, no attempt had been made to estimate the trivial difference between the two stages of processing.
[5]Refined silver and silver contained in blister copper and refinery muds.
[6]Less than 1/2 unit.
[7]Converted from figure reported in cubic meters; believed to represent only a small part of total output.
[8]Figure for 1979 reported as cubic meters, but that for 1980 reported as metric tons; it is believed that both figures actually represent metric tons.

Table 2.—Zambia: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1978	1979	Destinations, 1979	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	--	39	--	All to Malawi.
Copper: Metal including alloys:				
Unwrought	578,282	631,433	23,509	Japan 143,998; France 86,674; West Germany 75,541.
Semimanufactures	9,514	19,481	425	Yugoslavia 9,051; Republic of Korea 6,834; Spain 1,702.
Iron and steel: Metal, semimanufactures:				
Bars, rods, angles, shapes, sections	29	13	--	All to Zaire.
Universals, plates, sheets	--	2	--	Do.
Wire	--	2	--	All to West Germany.
Tubes, pipes, fittings	35	40	--	All to Malawi.
Lead:				
Oxides	219	357	--	Zaire 179; Tanzania 133; Malawi 45.
Metal including alloys:				
Scrap	279	1,019	--	Republic of South Africa 672; Tanzania 180; United Kingdom 102.
Unwrought	6,649	8,465	--	Republic of South Africa 3,431; Italy 2,456; India 1,096.
Semimanufactures	8	--		
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$45	$47	--	All to United Kingdom.
Silver: Waste and sweepings[1] kilograms	6	4	--	Do.
Tin: Metal including alloys, semimanufactures	1	--		
Zinc: Metal including alloys, unwrought	35,437	42,086	9,503	India 7,542; Kenya 4,751; Netherlands 4,013.
Other:				
Ashes and residues	1,310	1,146	--	United Kingdom 847; Japan 232; Belgium-Luxembourg 65.
Base metals including alloys, all forms	1,794	3,060	1,627	United Kingdom 1,041; China 173; U.S.S.R. 110.

See footnote at end of table.

Table 2.—Zambia: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	Destinations, 1979	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.: Dust and powder of precious and semiprecious stones, including diamond value, thousands	--	$1	--	All to Malawi.
Cement	35,627	80,866	--	Malawi 43,145; Tanzania 21,628; Burundi 14,612.
Diamond:				
Gem, not set or strung value, thousands	--	$201	--	All to Malawi.
Industrial do	--	$8	--	All to United Kingdom.
Fertilizer materials: Manufactured:				
Ammonia	--	4	--	All to Zaire.
Nitrogenous	314	352	--	Zaire 171; Malawi 122; Tanzania 58.
Gypsum and plaster	--	15	--	All to Malawi.
Lime	504	420	--	Do.
Mica: Worked including agglomerated splittings	--	1	--	All to Tanzania.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$650	$23	--	West Germany $19; Malawi $2; United Kingdom $2.
Synthetic do	$1	--		
Stone, sand and gravel: Gravel and crushed rock	11,860	75	--	All to Zaire.
Sulfur: Sulfuric acid	12,640	120	--	Zaire 84; Malawi 36.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	1,843	--	Malawi 1,839; Tanzania 4.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	11,283	921	--	Malawi 788; Zaire 102; Angola 20.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	3,400	2,935	--	All to Malawi.
Gasoline do	2,270	--		
Mineral jelly and wax do	--	181	--	Do.
Kerosine and jet fuel do	1,240	1,814	--	All to Zaire.
Distillate fuel oil do	4,013	11,130	--	Malawi 6,087; Tanzania 5,043.
Lubricants value, thousands	$80	$7	--	All to Zaire.
Bitumen and other residues 42-gallon barrels	3,000	6,581	--	Malawi 4,121; Burundi 2,460.

[1]May include other precious metals.

Table 3.—Zambia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1978	1979	Sources, 1979	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	1	1	--	Mainly from Switzerland.
Aluminum:				
Oxides and hydroxides	16	3	--	All from United Kingdom.
Metal including alloys, semimanufactures	923	762	1	United Kingdom 288; Tanzania 203; Israel 80.
Chromium: Oxides and hydroxides	--	3	--	Republic of South Africa 2; United Kingdom 1.
Copper: Metal including alloys:				
Unwrought	2	1	NA	NA.
Semimanufactures	430	946	1	Zaire 675; United Kingdom 166; Republic of South Africa 2.

See footnotes at end of table.

Table 3.—Zambia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	Sources, 1979	
			United States	Other (principal)
METALS —Continued				
Iron and steel:				
Metal:				
Pig iron, cast iron, related materials	133	299	NA	United Kingdom 63; unspecified 236.
Ferroalloys:				
Ferromanganese	109	140	--	All from United Kingdom.
Unspecified	8,460	109	NA	United Kingdom 46; unspecified 63.
Steel, primary forms	92	346	--	United Kingdom 315; Italy 26; Hong Kong 4.
Semimanufactures:				
Bars, rods, angles, shapes, sections	11,300	27,940	617	United Kingdom 14,012; Republic of South Africa 8,559; Japan 2,152.
Universals, plates, sheets	20,213	28,266	11	Republic of South Africa 11,653; United Kingdom 8,408; Japan 3,942.
Hoop and strip	1,031	1,091	--	Japan 636; United Kingdom 437; West Germany 18.
Rails and accessories	5,726	3,691	--	Republic of South Africa 1,554; United Kingdom 1,380; Malawi 562.
Wire	3,171	6,752	--	Republic of South Africa 3,072; Romania 1,388; Belgium-Luxembourg 1,041.
Tubes, pipes, fittings	3,306	3,951	66	Republic of South Africa 1,559; Sweden 661; United Kingdom 560.
Lead:				
Oxides	--	6	--	All from United Kingdom.
Metal including alloys:				
Unwrought	3	--		
Semimanufactures	8	20	--	United Kingdom 17; Republic of South Africa 3.
Magnesium: Metal including alloys:				
Unwrought value, thousands	--	$1	--	All from West Germany.
Semimanufactures do	--	$3	--	All from United Kingdom.
Manganese: Oxides	8	89	--	Republic of South Africa 66; Belgium-Luxembourg 13; West Germany 10.
Metalloids: Unspecified	23	44	--	United Kingdom 35; West Germany 8.
Nickel: Metal including alloys, semimanufactures	1	5	--	All from Mauritius.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$111	$182	--	United Kingdom $181; West Germany $1.
Silver: Metal including alloys, unwrought and partly wrought do	$3	$19	--	United Kingdom $18; Republic of South Africa $1.
Tin: Metal including alloys:				
Scrap do	--	$1	--	All from United Kingdom.
Unwrought	20	49	--	Do.
Semimanufactures	9	1,206	1	France 1,177; United Kingdom 27.
Titanium: Oxides	459	593	--	United Kingdom 307; West Germany 132; Republic of South Africa 71.
Tungsten: Metal including alloys, semimanufactures value, thousands	$9	$3	--	United Kingdom $2; Republic of South Africa $1.
Zinc:				
Oxides	176	240	--	United Kingdom 173; Republic of South Africa 47; Kenya 20.
Metal including alloys, semimanufactures value, thousands	$1	$3	--	All from United Kingdom.
Other:				
Ores and concentrates	10	10	--	Belgium-Luxembourg 6; Republic of South Africa 3.
Ashes and residues value, thousands	--	$1	--	All from United Kingdom.
Base metals including alloys, all forms	42	83	(1)	China 54; United Kingdom 17; Zaire 11.

See footnotes at end of table.

Table 3.—Zambia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	Sources, 1979	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$1	$1	--	All from West Germany.
Grinding and polishing wheels and stones do	$242	$256	$1	United Kingdom $202; West Germany $17; Republic of South Africa $17.
Asbestos, crude	2,946	1,297	--	All from Republic of South Africa.
Barite and witherite	--	31	--	United Kingdom 30.
Boron materials: Oxides and acids	20	--		
Cement	501	87	--	Belgium-Luxembourg 59; United Kingdom 22.
Chalk	51	118	--	All from United Kingdom.
Clays and clay products:				
Crude, unspecified	1,601	993	374	United Kingdom 408; Republic of South Africa 97; West Germany 63.
Products:				
Nonrefractory value, thousands	$351	$98	--	Republic of South Africa $60; Italy $24; United Kingdom $13.
Refractory including nonclay brick do	$4,957	$5,755	--	United Kingdom $3,721; Republic of South Africa $1,050; Canada $707.
Diamond: Industrial do	$438	$310	--	United Kingdom $275; Ireland $35.
Diatomite and other infusorial earth	123	119	--	France 62; Belgium-Luxembourg 57.
Fertilizer materials: Manufactured:				
Nitrogenous	40,566	120,438	61,423	Japan 36,169; Italy 17,000; India 2,500.
Potassic	--	26	--	All from Switzerland.
Unspecified and mixed	5	27	--	All from United Kingdom.
Graphite, natural	--	1	--	Do.
Gypsum and plaster	129	774	--	Republic of South Africa 728; United Kingdom 35; West Germany 11.
Halogens:				
Chlorine	338	343	--	Republic of South Africa 283; West Germany 41; Tanzania 19.
Unspecified	39	16	--	Republic of South Africa 12; United Kingdom 3; West Germany 1.
Magnesium compounds: Magnesite	--	1	--	All from Japan.
Mica: Worked including agglomerated splittings	1	1	--	All from United Kingdom.
Phosphates, crude	8	--		
Pigments, mineral: Iron oxides and hydroxides, processed	90	159	--	West Germany 57; United Kingdom 47; Japan 45.
Precious and semiprecious stones other than diamond: Natural value, thousands	$10	--		
Pyrite, unroasted	--	2	--	All from Republic of South Africa.
Salt and brine value, thousands	$475	$1,350	--	Republic of South Africa $956; West Germany $140; United Kingdom $133.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	2	203	--	West Germany 150; Tanzania 28; Belgium-Luxembourg 24.
Sodium carbonate, manufactured	2,755	825	--	West Germany 225; Kenya 190; United Kingdom 182.
Sodium hydroxide	2,076	2,698	--	United Kingdom 1,106; West Germany 919; Republic of South Africa 432.

Table 3.—Zambia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	Sources, 1979	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	11	--	All from United Kingdom.
Worked	1	1	--	All from India.
Quartz and quartzite	5	--		
Sand other than metal-bearing	--	2	NA	NA.
Sulfur:				
Elemental:				
Crude including native and byproduct	51	48	--	All from United Kingdom.
Colloidal, precipitated, sublimed	22	56	--	West Germany 35; Belgium-Luxembourg 11; United Kingdom 10.
Sulfuric acid	28	2,079	--	Republic of South Africa 2,064; United Kingdom 15.
Talc, steatite, soapstone, pyrophyllite	12	49	--	Italy 36; United Kingdom 11; West Germany 2.
Other:				
Crude	(1)	1	--	All from United Kingdom.
Oxides and hydroxides of barium, magnesium, strontium value, thousands	$1	$4	--	West Germany $2; Republic of South Africa $2.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	r200	8	(1)	Republic of South Africa 7.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	807	155	--	Trinidad and Tobago 93; Republic of South Africa 51; United Kingdom 11.
Carbon: Carbon black	1,748	1,653	--	Republic of South Africa 884; United Kingdom 348; West Germany 186.
Coke and semicoke	99,000	2	--	All from United Kingdom.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	5,992	5,335	--	All from Saudi Arabia.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	r151	220	12	United Kingdom 151; Netherlands 29; Sweden 28.
Gasoline do	33,702	6,758	--	Iran 6,536; Tanzania 212.
Mineral jelly and wax do	19,911	16,189	--	West Germany 6,721; United Kingdom 4,242; China 3,935.
Kerosine and jet fuel do	r2,154	5,270	--	Republic of South Africa 2,147; United Kingdom 1,496; Netherlands 1,325.
Lubricants value, thousands	$12,001	$17,644	$30	Republic of South Africa $6,584; Kenya $4,811; Italy $2,351.
Residual fuel oil 42-gallon barrels	9,744	113	73	West Germany 20; United Kingdom 20.
Bitumen and other residues do	812	1,679	--	West Germany 420; United Kingdom 412.
Tars and other crude chemicals derived from coal, gas, and petroleum	11	186	--	Italy 97; United Kingdom 84; West Germany 5.

rRevised. NA Not available.
1Less than 1/2 unit.

COMMODITY REVIEW

METALS

Copper, Cobalt, Byproduct Gold, Selenium, and Silver.—ZCCM treated approximately 29.8 million tons of ore yielding about 530,000 tons of copper. Ore reserves as published in the ZCCM annual report for the year ending March 31 were estimated at 26,500,000 tons of contained copper and 688,000 tons of contained cobalt.

The Nchanga division was ZCCM's biggest copper producer as well as the largest copper mine in Zambia. Drilling continued in the Nchanga open pit to investigate the tenor of ore and attitude of the eastern extension of the upper folded cobalt ore body. Boreholes were also drilled at other sections to investigate the cobalt content of the folded upper ore body.

The Mufulira division's production comes from one of the world's largest underground copper mines. Its metallurgical operations span concentrating, smelting, and refining. A precious metals plant was in operation at the Ndola copper refinery that was administered by Mufulira. Ore production was below that scheduled at Mufulira for 1982 owing to strikes, a shortage of drilled reserves, and outages of the underground plant. The low mine output also limited the concentrator operations.

Operations at the precious metals plant were generally satisfactory and all recovered anode slimes from the refineries were accepted for treatment. The selenium removal process continued to be a major constraint and a significant proportion of the total output was exported as decopperized slimes. Total production was 23,234 kilograms of selenium, 887,000 troy ounces of silver, and 13,439 troy ounces of gold. Minor quantities of platinum and palladium were also recovered.

Table 4.—Zambia: ZCCM 1982 copper production and ore reserves, by mine

Mine	Ore mined and treated			Ore reserves		
	Gross weight (thousand metric tons)	Copper grade (percent)	Copper recoverable in copper concentrate (percent)	Gross weight (thousand metric tons)	Copper grade (percent)	Cobalt (percent)
Mufulira (underground)	5,423	2.07	93.00	102,955	3.05	--
Luanshya (underground)	3,938	1.27	93.65	51,028	2.44	--
Baluba (underground)	1,775	1.52	92.13	57,937	2.52	0.16
Chambishi (underground)	2,315	1.50	94.60	28,848	2.81	--
Chibuluma (underground)	661	2.58	96.89	7,210	3.71	.19
Kalengwa (open pit)[1]	166	2.23	62.15	--	--	--
Nkana (underground)	4,075	1.41	95.52	109,986	2.32	.13
Bwana Mkubwa (open pit)	581	2.06	77.52	197	3.40	--
Chingola (underground and open pit)	9,216	3.26	70.95	268,288	3.16	.05
Konkola (underground)	1,678	3.10	84.42	207,162	3.72	.06
Kansanshi (open pit)	--	--	--	26,278	3.10	--
Grand total or average	29,828	2.23	82.36	859,889	3.08	.08

[1]Stockpiled ore was used for Kalengwa mill feed.

Source: Zambia Consolidated Copper Mines Ltd., 1982 Annual Report.

The Nkana division operates the deepest ZCCM mines with two shafts extending to 1,200 meters. There are three open pit operations, a concentrator, a smelter, and a refinery. Nkana's cobalt production capacity was being augmented with the construction of a new 2,500-ton-per-year plant. Production at the existing cobalt plant at Nkana was below forecasts as a result of the lower grade of concentrates treated. Work on the plant's rehabilitation and expansion was continued throughout 1982.

At Baluba, exploration of the eastern part of the center limb was completed, with exploration of the western section in progress. Drilling was also in progress to explore deep into the northern limb in the search for new ore. Successful commissioning of the lower crusher installation and rock handling facilities allow production to be initiated below the 245-meter level. Major development was constrained by rock handling problems.

At the Kalulush division's Chambishi roast-leach-electrowinning, 2,500-ton-per-year plant, production levels were reduced and greater emphasis was placed on the treatment of stockpiled low-grade concen-

trate because of the continued weakness of the cobalt market. The installation of the Chambishi cobalt metal vacuum refining plant was proceeding satisfactorily.

Lead, Zinc, and Byproduct Cadmium.—Ore hoisted totaled 237,133 tons at grades of 9.0% lead and 20.3% zinc. Byproduct cadmium is produced in very small amounts. The Kabwe division includes the Nampundwe Mine and concentrator near Lusaka, where a copper concentrate and pyrite concentrate for acid production was to be produced. Working the Nampundwe expansion project continued throughout the year.

NONMETALS

Fertilizer Materials.—Major phosphate deposits were recently discovered in Zambia's Eastern Province. The full extent of the reserves, unknown as yet, will need further tests before it can be decided whether exploitation is feasible. The deposits at Chilembwe have an average phosphate content of 15% to 20%. Only 200,000 tons of reserves have been identified. The deposits at Kaluwe are estimated to contain reserves of 200 million tons; however the deposits are of low grade and thinly distributed.

Gem Stones (Amethyst and Emerald).—An agreement was reached between International Development and Construction Co. (IDCO) of Saudi Arabia and Reserve Minerals Corp. of Zambia, whereby the former takes up to 49% equity in companies formed to prospect, mine, and market emeralds and other precious minerals. IDCO will provide interest-free loans where necessary for the company's development.

MINERAL FUELS

Coal.—Production of coal at Maamba Collieries increased 14.5% over that of 1981, to 603,934 tons. A loan of $5.7 million in 1981 provided funds to renovate the coal washing plant, and to purchase some small equipment in 1982. Foreign exchange was unavailable to purchase needed new larger equipment or spare parts for the larger old equipment. Maamba Collieries is an open pit operation containing three coal seams totaling 10 meters in thickness. The majority of production was used in Zambia with smaller amounts purchased by Malawi and Zaire.

Petroleum.—Zambia signed an agreement with Exploration Data Consultancy to prospect for oil and natural gas in the Luangwa Valley and west of Lusaka. The 3-year project was funded by the International Bank for Reconstruction and Development (World Bank) and the Government of Zambia.

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[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, Zambian kwachas (K) have been converted to U.S. dollars at the rate of K1=US$1.0543.

The Mineral Industry of Zimbabwe

By George A. Morgan[1]

The predominately export-oriented mineral industry continued to be depressed in 1982, experiencing persistently low demand and prices. Total value of minerals produced was estimated at $460 million compared with $547 million in 1981.[2] Expenditures on new mines were virtually halted, and current mineral industry developments were the result of decisions made years ago. Underground development was being retarded at many mines.

Production of iron ore, chromite, and asbestos declined in the face of weak market demand. Gold output increased despite closure of many small mines, mainly owing to the startup of the Renco Mine and the mining of higher grade ore. Output of nickel and copper stabilized.

Government Policy and Programs.—The National Development Plan proposed a $5.54 billion spending program for 1983-85, 41% of which was to come from private companies. The Mining Industry Loan Fund, which receives an annual allocation from the state budget of about $50 million, had a number of loan programs for the mining sector.

The Government initiated measures to cope with the deteriorating balance of trade and rising unemployment. A 32% cut in foreign currency allocations to the private sector was initiated, and at yearend, a 20% devaluation of the Zimbabwe dollar occurred. Any retrenchment, including dismissal, firing, or suspension of a worker, must be approved by the Ministry of Labor and Social Services. Overtime was banned, ostensibly to create more jobs. Bonding was also required of apprentices.

The Minerals Marketing Corp. (MMC) commenced implementation of certain provisions of its charter. Exports of ore were prohibited, except in exceptional cases. The MMC has responsibility for transport of all minerals, as well as for external payments for products.

PRODUCTION

The index of volume of mineral production declined for the sixth consecutive year from 172.2 in 1981 to 168.0 in 1982 (1964=100). The manufacturing sector was also adversely affected. The index of volume of production of nonmetallic mineral products was 252.0 in 1982 compared with 272.4 in 1981 (1964=100), and for metal and metal products 280.8 compared with 323.9. Small mine closures, mainly gold mines, resulted in the loss of about 2,000 positions, and the closure of the Empress nickel mine caused the loss of 1,200 jobs and 2,000 tons per year of nickel metal production capacity.

Table 1.—Zimbabwe: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
METALS					
Aluminum: Bauxite, gross weight	4,818	5,076	4,281	5,139	7,533
Antimony, mine output, metal content	r67	r87	83	145	206
Arsenic, white	129	--	79	21	--
Beryllium: Beryl concentrate, gross weight	35	28	9	42	52
Cesium minerals: Pollucite	--	--	88	100	80
Chromium: Chromite, gross weight, thousand tons	478	542	554	536	432
Cobalt:					
Mine output, recoverable metal content[e]	17	210	120	100	100
Metal (including content of refinery sludges)	17	204	115	94	98
Columbium and tantalum: Tantalite concentrate:					
Gross weight, kilograms	31,000	30,000	41,000	45,000	36,000
Columbium content[e], do	3,175	3,175	4,500	6,800	3,960
Tantalum content[e], do	7,700	8,160	10,400	15,900	18,000
Copper:					
Mine output, metal content	33,848	29,600	26,921	24,583	24,800
Metal:[2]					
Smelter, primary[e]	32,200	28,500	26,100	23,000	23,200
Refinery, primary[e]	3,000	3,000	3,100	8,000	23,000
Gold, mine output, metal content, thousand troy ounces	399	388	368	371	426
Iron and steel:					
Iron ore:					
Gross weight, thousand tons	1,123	1,201	1,622	1,096	837
Metal content[e], do	674	721	973	660	500
Metal:					
Pig iron[e], do	600	600	600	400	250
Ferroalloys:[e]					
Ferromanganese	2,400	2,400	2,400	2,000	1,000
Ferrochromium	200,000	200,000	260,000	209,072	180,000
Total	202,400	202,400	262,400	211,072	181,000
Crude steel, thousand tons	778	740	804	600	528
Nickel:					
Mine output, metal content	15,701	14,591	15,075	13,018	13,309
Metal, smelter[e 3]	13,000	13,200	14,100	11,500	11,600
Platinum-group metals:					
Platinum, troy ounces	--	--	2,990	2,300	1,704
Palladium, do	--	--	6,784	5,200	2,765
Total, do	--	--	9,774	7,500	4,469
Silver, mine output, metal content, thousand troy ounces	1,109	978	949	857	918
Tin:					
Mine output, metal content[e]	1,310	1,340	1,300	1,600	1,600
Metal, smelter	945	967	934	1,157	1,197
Tungsten, concentrate output:					
Gross weight	279	224	194	119	67
Metal content[e]	130	110	90	55	30
NONMETALS					
Abrasives: Natural corundum	7,366	16,628	18,681	12,202	8,714
Asbestos, thousand tons	249	269	251	248	194
Barite	878	449	195	--	800
Cement, hydraulic, thousand tons	408	396	[e]400	400	400
Clays:					
Bentonite (montmorillonite)	53,319	54,320	69,153	78,403	85,490
Fire clay	12,430	16,745	17,005	14,658	11,746
Kaolin	1,017	2,686	4,450	4,657	2,442
Feldspar	726	1,085	1,263	2,393	666
Fluorspar	312	--	--	--	--
Gem stones, precious and semiprecious:[4]					
Amethyst, kilograms	3,491	3,228	4,001	NA	NA
Garnet, do	133	2,000	125	NA	NA
Topaz, do	2	--	--	NA	NA
Tourmaline, do	98	6	5	NA	NA
Graphite	[e]5,000	5,736	7,385	11,218	8,225
Kyanite	1,835	--	716	870	2,207
Lithium minerals, gross weight	16,688	13,197	21,030	16,444	9,787
Magnesite	65,756	84,495	78,217	60,194	60,660
Mica	2,764	1,275	1,022	1,406	861
Nitrogen: N content of ammonia[e], thousand tons	60	60	57	52	84
Phosphate rock, marketable concentrates, do	107	136	130	122	122
Pigments, iron oxide[e]	100	500	1,000	1,200	1,000
Pyrite, gross weight, thousand tons	56	66	68	65	58
Quartz[5]	95,588	143,688	166,407	142,174	688,614
Stone: Limestone, thousand tons	1,087	1,057	1,218	1,409	1,270

See footnotes at end of table.

Table 1.—Zimbabwe: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
NONMETALS —Continued					
Sulfur:					
S content of pyrite thousand tons	24	28	29	25	25
Byproduct of coal and metallurgy[e] do	5	5	5	5	5
Total[e] do	29	33	34	30	30
Talc	758	1,170	456	386	270
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	3,065	3,188	3,134	2,867	2,769
Coke, metallurgical[6] do	179	201	235	200	200

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through June 16, 1983.

[2]Smelter copper includes impure cathodes produced by electrowinning in nickel processing. Output of fire-refined copper by Messina (Transvaal) Development Corp. apparently was terminated in 1972. Refined copper output from that date to 1980 includes only electrolytic copper output by Corsyn Consolidated Mines Ltd. at the Inyati Mine. Output in 1981 and 1982 includes electrolytic copper from the new refinery at Messina.

[3]Includes Ni content of nickel oxide and nickel fonte.

[4]Other gem stones produced are as follows in kilograms: 1981—beryl, 327, and chrysoberyl, 2; and 1982—beryl, 1,080, and aquamarine, 36.

[5]Includes rough and ground quartz as well as silica sand. Quartz crystal was also produced in the amount of 3 metric tons in 1979.

[6]Data represent output by the Wankie Colliery for years ending Aug. 31 of that stated; additional output by the Radcliff plant of Risco Ltd. may total 250,000 metric tons per year of metallurgical coke and coke breeze.

TRADE

Total mineral exports were estimated at $478 million in 1982, about 47% of all exports. Gold was the principal mineral export commodity, followed by ferrochrome and asbestos. Ferrochrome was the principal mineral export item of value in 1981.

Mineral-related imports were estimated at $300 million in 1982, of which 58% was petroleum and refinery products. The principal trade markets were the Republic of South Africa, the United Kingdom, and the United States. Pipeline shipments continued to be subject to disruption owing to sabotage.

The preferential trade agreement was renewed by the Republic of South Africa; it allowed substantial benefits to Zimbabwean exporters owing to its low tariff provisions.

Table 2.—Zimbabwe: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980[r]	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Antimony: Ore and concentrate	NA	26	26	
Cobalt: Oxides and hydroxides value, thousands	[2]$4,224	NA		
Copper: Metal including alloys, all forms	[2]22,735	[2]17,943	--	Italy 1,296; Japan 595; West Germany 486.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	1,087	--	All to France.
Iron and steel: Metal:				
Pig iron, cast iron, related materials[2]	36,041	10,195	--	NA.
Ferroalloys	[2]257,306	[2]220,575	65,592	West Germany 43,817; France 41,964; Japan 27,409; Italy 23,301.
Steel, primary forms	[2]305,545	[2]207,827	--	Jordan 10,891; Taiwan 1,016.
Semimanufactures:				
Bars, rods, angles, shapes, sections	[2]215,948	[2]118,402	510	Jordan 9,327; Hong Kong 6,840; United Kingdom 5,298; Saudi Arabia 2,476.
Universals, plates, sheets	6	693	--	All to Jordan.
Wire	[2]18,660	[2]18,167	--	Saudi Arabia 3,242; United Kingdom 26.
Unspecified value, thousands	[2]$32,410	NA		

See footnotes at end of table.

Table 2.—Zimbabwe: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980[r]	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lithium: Ore and concentrate[2]	18,373	16,163	--	NA.
Nickel:				
Matte and speiss	--	159	--	All to Spain.
Metal including alloys, all forms	[2]14,449	[2]11,685	1,353	West Germany 2,036; Japan 1,039; France 1,010.
Platinum-group metals: Metal including alloys, unwrought and partly wrought value, thousands	$40	$6	--	All to Switzerland.
Silver:				
Ore and concentrate[3] do.	[2]$1,923	[2]$1,545	NA	United Kingdom $80.
Waste and sweepings[3] do.	[2]$5,425	[2]$7,834	--	France $425.
Metal including alloys, unwrought and partly wrought do.	$83	--		
Tantalum: Ore and concentrate do.	[2]$4,430	[2]$2,938	$1,805	NA.
Tin: Metal including alloys, all forms	[2]891	[2]950	154	West Germany 118; United Kingdom 100; France 51.
Tungsten: Ore and concentrate[2]	201	130	NA	NA.
Other:				
Ores and concentrates	70	245	204	West Germany 20; Sweden 14; Austria 1.
Ashes and residues	NA	251	--	Spain 153; United Kingdom 98.
Base metals including alloys, all forms	NA	4	--	All to Austria.
NONMETALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	NA	18	--	All to Japan.
Asbestos, crude	[2]274,258	[2]198,958	1,678	Japan 24,272; Spain 18,977; United Kingdom 4,783; Austria 4,003.
Cement[2] value, thousands	$2,966	$2,212	--	NA.
Clays and clay products: Crude, unspecified	1	--		
Diamond: Gem, not set or strung value, thousands	$15	$59	$2	Switzerland $50; France $7.
Feldspar, fluorspar, related materials	NA	412	--	All to West Germany.
Graphite, natural	NA	70	--	All to France.
Magnesium compounds: Magnesite[2] value, thousands	$1,698	$1,746	NA	NA.
Precious and semiprecious stones other than diamond do.	[2]$2,322	[2]$3,457	$43	Switzerland $1,603; United Kingdom $526; West Germany $249.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	36	79	--	All to United Kingdom.
Worked	7	27	([4])	Saudi Arabia 19; Netherlands 5; France 2.
Gravel and crushed rock	NA	97,453	--	All to United Kingdom.
Quartz and quartzite	NA	75	--	West Germany 38; Netherlands 37.
Talc, steatite, soapstone, pyrophyllite value, thousands	--	$7	$7	
Other: Crude	1,297	1,212	--	Japan 1,014; West Germany 198.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades[2]	229,498	116,357	--	NA.
Coke and semicoke[2]	113,388	112,921	--	NA.

[r]Revised. NA Not available.

[1]Owing to a lack of official trade data published by Zimbabwe, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from various sources, which include United Nations information, data published by the partner trade countries, and partial official trade data of Zimbabwe. Unless otherwise specified, data are compiled from official trade statistics of individual trading partners.

[2]Monthly Digest of Statistics, December 1982, Central Statistical Office, Harare, Zimbabwe.

[3]May include other precious metals.

[4]Less than 1/2 unit.

Table 3.—Zimbabwe: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980[r]	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	--	2	--	All from United Kingdom.
Aluminum:				
Oxides and hydroxides	14	74	(2)	Mainly from West Germany.
Metal including alloys:				
Unwrought	49	1,917	--	France 1,270; Spain 647.
Semimanufactures				
value, thousands	[3]$8,179	[3]$12,990	$182	France $1,801; Hong Kong $475; Belgium-Luxembourg $352; United Kingdom $327.
Chromium: Oxides and hydroxides	--	40	--	All from Italy.
Copper: Metal including alloys:				
Unwrought	--	119	--	All from France.
Semimanufactures	46	117	19	United Kingdom 44; Japan 24; West Germany 12.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	51	51	--	All from Sweden.
Ferroalloys[3] value, thousands	$2,325	$2,413	--	NA.
Steel, primary forms	--	10,805	--	Belgium-Luxembourg 7,641; West Germany 3,162.
Semimanufactures:				
Bars, rods, angles, shapes, sections value, thousands	[3]$7,175	[3]$9,107	--	West Germany $114; Belgium-Luxembourg $87; France $23.
Universals, plates, sheets do	[3]$44,595	[3]$41,882	--	Japan $2,292; Belgium-Luxembourg $939; France $468.
Hoop and strip	[4]9	100	--	Japan 77; United Kingdom 23.
Rails and accessories[3] value, thousands	$4,114	$8,643	--	NA.
Wire	[5]75	812	5	United Kingdom 678; Belgium-Luxembourg 86; Sweden 16.
Tubes, pipes, fittings value, thousands	[3]$6,651	[3]$7,875	$21	Japan $303; Austria $93; United Kingdom $58.
Lead:				
Oxides	--	36	--	All from West Germany.
Metal including alloys, semimanufactures value, thousands	[3]$1,015	NA		
Manganese:				
Ore and concentrate	--	70	--	All from Netherlands.
Oxides	9	--		
Metalloids: Unspecified	390	709	--	France 700; West Germany 9.
Nickel: Metal including alloys, semimanufactures	4	[6]17	11	West Germany 6.
Platinum-group metals: Metal including alloys, unwrought and partly wrought value, thousands	$1	--		
Silver: Metal including alloys, unwrought and partly wrought do	$16	$26	$7	West Germany $14; Switzerland $5.
Tungsten: Metal including alloys, scrap and unwrought kilograms	--	430	430	
Uranium and/or thorium: Ore and concentrate value, thousands	--	$140	--	All from United Kingdom.
Zinc:				
Oxides	19	785	--	United Kingdom 755; France 30.
Metal including alloys, all forms[3] value, thousands	$2,782	$3,207	--	NA.
Other:				
Ores and concentrates	8	--		
Base metals including alloys, all forms value, thousands	$9	$28	--	United Kingdom $17; West Germany $11.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	14	23	1	West Germany 7; Austria 5; Norway 4.
Boron materials:				
Crude natural borates	--	522	--	All from Netherlands.
Oxides and acids	6	41	--	All from France.
Cement	21	(2)	(2)	
Chalk	107	54	--	All from France.
Clays and clay products:				
Crude, unspecified	1,033	--		
Products:				
Nonrefractory	36	71	--	All from West Germany.
Refractory including nonclay brick value, thousands	[3]$7,094	[3]$7,260	$5	Austria $781; West Germany $165; United Kingdom $112.

See footnotes at end of table.

Table 3.—Zimbabwe: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980[r]	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung value, thousands	$3	$39	--	Switzerland $19; Hong Kong $17; United Kingdom $3.
Industrial ---do---	$21	--		
Diatomite and other infusorial earth	5	--		
Fertilizer materials: Manufactured:				
Ammonia[3] value, thousands	$6,584	$9,771	--	NA.
Nitrogenous ---do---	[3]$7,469	[3]$20,147	$45	Netherlands $6,127; Japan $715; West Germany $160.
Phosphatic	--	7,707	3,130	Belgium-Luxembourg 4,572; United Kingdom 5.
Potassic value, thousands	[3]$7,435	[3]$12,559	--	West Germany $1,285.
Graphite, natural	3	5	--	All from West Germany.
Gypsum and plaster	21	56	2	West Germany 54.
Halogens: Unspecified	--	1	--	All from United Kingdom.
Magnesium compounds: Magnesite	2	(2)	--	All from West Germany.
Mica: Worked including agglomerated splittings	1	1	--	Mainly from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$110	$75	$2	Switzerland $53; Hong Kong $14; West Germany $6.
Synthetic ---do---	$12	$16	$2	Switzerland $13; Taiwan $1.
Salt and brine ---do---	[3]$2,070	[3]$1,989	--	West Germany $105; United Kingdom $1.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	50	27	--	All from France.
Sodium carbonate, manufactured	190	--		
Sodium hydroxide value, thousands	[3]$2,196	[3]$2,504	--	France $212; Belgium-Luxembourg $6; West Germany $2.
Sulfur: Elemental, crude including native and byproduct[3] ---do---	$1,573	$3,174	--	NA.
Other:				
Crude	2	33	16	West Germany 17.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	1	--	All from United Kingdom.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	57	58	--	West Germany 48; United Kingdom 10.
Coal: All grades including briquets and coke[3] value, thousands	$3,475	$3,379	--	NA.
Hydrogen, helium, rare gases	14	--		
Petroleum and refinery products:				
Total crude petroleum and refinery products:[3] value, thousands	$271,059	$273,470	NA	NA.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	--	174	--	All from United Kingdom.
Gasoline ---do---	76,093	77	--	Belgium-Luxembourg 68; West Germany 8.
Mineral jelly and wax ---do---	2,668	7,713	1,275	West Germany 5,210; France 1,165; Netherlands 47.
Kerosine and jet fuel ---do---	29,326	--		
Distillate fuel oil ---do---	131,468	52	--	All from West Germany.
Lubricants ---do---	2,100	3,974	208	West Germany 3,738; Netherlands 21; United Kingdom 7.
Bitumen and other residues ---do---	42	--		
Bituminous mixtures ---do---	6	--		

[r]Revised. NA Not available.

[1]Owing to a lack of official trade data published by Zimbabwe, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from various sources, which include United Nations information, data published by the partner trade countries, and partial official trade data of Zimbabwe. Unless otherwise specified, data are compiled from official trade statistics of individual trading partners.

[2]Less than 1/2 unit.

[3]Monthly Digest of Statistics, December 1982, Central Statistical Office, Harare, Zimbabwe.

[4]Excludes Japanese exports valued at $9,000.

[5]Excludes part of Japanese exports valued at $2,000.

[6]Excludes unreported quantities valued at $3,000 from United Kingdom and $1,000 from Switzerland.

COMMODITY REVIEW

METALS

Chromite.—Zimbabwe Alloys Ltd. (Zimalloys), formerly Rhodall Ltd., an Anglo American Corp. Ltd. subsidiary, acquired full control of Consolidated Minerals Ltd. (Conmin) for $3 million. Conmin was an important supplier of hard lumpy chromite to the Gwelo refinery of Zimalloys. It owned the Netherburn Mine with 930 employees and the Rhonda Mine, which has not produced for 5 years because of war-related damage. Zimalloys reported $1 million in lost production owing to carelessness, lack of effort, and poor timekeeping, as well as $1 million of equipment repair that should have been unnecessary. Labor problems were also encountered owing to new labor legislation and noncooperative worker committees.

Zimbabwe Mining and Smelting Co., a subsidiary of Union Carbide Corp., had a debt of $40 million in 1982. It no longer had control over stockpile levels owing to implementation of the Minerals Marketing Corp. legislation. The high cost of domestic chromite production reportedly made it cheaper to import chromite from the Republic of South Africa than to produce it locally.

Copper.—Messina (Transvaal) Development Corp. of the Republic of South Africa had a $93 million loss on its Zimbabwe operations under M.T.D. (Mangula) Ltd. The company required a loan guarantee of $8.1 million from the Zimbabwe Government to maintain operations at Mangula. Although uneconomic to operate, production was also maintained at the Shackelton Mine at Government request.

Gold.—The Renco Mine, owned and operated by Rio Tinto Zimbabwe Ltd. (RTZ), commenced production with a projected mill throughput of 180,000 tons per year of ore and recovery of about 43,000 troy ounces of gold.

Corsyn Consolidated Mines Ltd. reported a total mill throughput of 363,000 tons of ore from its four operating mines for the year ending September 1982 and a total production of 50,155 troy ounces of gold, down slightly from 1981 output.

To maintain the operations of small workers, who were most affected by costs, low gold prices, and wage legislation, the Government encouraged the creation of cooperatives. The additional problem of poor security caused destruction and theft of machinery and closure of some mines in Matabeleland.

Iron and Steel.—The Zimbabwe Iron and Steel Co. lost $1.5 million per month owing to falling exports and escalating costs. A transport crisis required the financing of a 250,000-ton stockpile compared with a normal 10,000-ton stockpile for its products. Voest-Alpine AG, Austria, was providing technical, professional, and financial assistance.

Lancashire Steel (Pvt.) Ltd. was shut down for 8 weeks owing to an unfavorable price structure for its products. A Government-approved price increase of 20% for rod and 30% for wire allowed the company to restart, but at greatly reduced personnel levels. By yearend about 600 people were laid off.

Platinum.—The Zinca platinum-group metals pilot project of RTZ continued in operation. About $2 million has been spent thus far on the plant, which has yielded higher results than were achieved in the laboratory. A decision on the mine startup was rescheduled for 1983.

NONMETALS

Asbestos.—Shabani and Mashaba (Pvt.) Ltd. had a loss of $38 million in 1982. The Government prevented the company from reducing fiber production from 110,000 tons per year to 33,000 tons per year. Full employment also had to be maintained. Negotiations were underway to sell the Government's 40% of the mining operation.

Graphite.—The Lynx Mine near Karoi was the only graphite producer in Zimbabwe and was a joint venture by Graphitwerk Kropfmuhl Ltd. and the Industrial Development Corp. Employment was 194 people working 2 underground shifts and 3 surface mill shifts. The main ore zone had 20% to 25% graphite. About 4,500 tons per month of ore was processed for about 1,200 tons per month of product. Mine life was 25 years at current production levels. Sulfide content was reduced to below 0.02% for a marketable product. Products included concentrate, flake larger than 160 micrometers, and powder smaller than 160 micrometers. Purity was 91% to 93%, and moisture content was below 1%. Products were trucked to the railhead at Chinhoyi for world export.

Lithium.—Bikita Minerals (Pvt.) Ltd. ceased production of lithium minerals in 1982 owing to low demand. Selection Trust Ltd., a subsidiary of British Petroleum Corp., was the owner of the operation along with AMAX Inc. and American Potash and Chemical Corp. Stocks at the mine were

sufficient for 2 years of sales. About 164 of the 300 workers at the mine resigned in return for a cash gratuity.

Phosphate.—Capacity of the concentrator at Dorowa was 180,000 tons per year. The deposit, which had no overburden, was mined by bulldozers and scrapers. About 10 tons of run-of-mine rock were processed to 1 ton of concentrate. The ore is upgraded from 5.5% P_2O_5 to 35% P_2O_5 in the concentrate. Processed raw material was trucked 65 kilometers to the Nyazura railhead, then railed to the plant at Muasa near Harare for upgrading by Zimbabwe Phosphate Industries (Zimphos). Marketable products were superphosphate and compound fertilizer. Low-fluorine phosphate was produced at Zimphos for stockfeed, and byproduct magnetite was sold for use as heavy media.

MINERAL FUELS

Coal.—The Zimbabwean Government acquired 40% of the equity capital in the Wankie Colliery Co. Ltd., making it the largest shareholder. Other shareholders were Anglo American (Zimbabwe), 20.2%, and Union Minière S.A., 3.3%. About 70% of the coal produced was sold to state-controlled concerns.

The coke ovens at Wankie were in constant need of repair and were to be rebuilt in 1983. They suffered damage from cooling during two labor strikes and from lax operations. Production was about 50% of the rated 20,000-ton-per-month capacity.

Shipment of 9,000 tons per month of coke to Zaire was halted owing to an embargo by Zambia on all rail traffic to Zaire owing to nonpayment of fees by that country. About $1 million in foreign exchange was lost per month.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Zimbabwean dollars (Z$) to U.S. dollars at the rate of Z$1.00=US$1.39 in 1981 and Z$1.00=US$1.09 in 1982.

The Mineral Industry of Other Central African Countries

By Suzann C. Ambrosio[1]

CONTENTS

CAMEROON

Cameroon's mining industry continued to be dominated by crude petroleum. The value of petroleum output was estimated at $1 billion.[2] The 1982 gross domestic product (GDP) was approximately $8.4 billion. During 1981, crude oil export revenues increased in value 30%, comprising approximately 56% of Cameroon's total export earnings. The 1982-87 5-year plan emphasized hydrocarbon and agricultural development and targeted the exploitation of bauxite and clay deposits.

New petroleum legislation was promulgated on November 26, 1982. Public Law No. 82-20 detailed hydrocarbon companies' obligations concerning oil and gas discoveries and exploitation. In general, the Cameroon Government has participated in joint ventures with private companies and has levied a 57.5% petroleum tax plus adjustable royalties. Exploration expenses were paid by concession holding companies, and the Government in the past has reimbursed 50% of expenses under certain conditions.

Since 1978, Cameroon has maintained relatively rapid economic growth and relatively low levels of debt service payments. This has largely been achieved through foreign aid development assistance. During 1981, external debts were estimated at $83 million, equivalent to roughly 8% of the national budget. During 1981, donor commitments for ongoing projects were approximately $325 million. The International Bank for Reconstruction and Development (World Bank) was continuing to finance a variety of infrastructure projects and was negotiating a $33 million Douala Port expansion project. Plans included three new wharves, storage facilities, and an access road, doubling handling capacity to 4.5 million tons. The Douala Port also serves Chad and the Central African Republic.

Plans were announced by the Cameroon Government to develop the nation's bauxite and iron ore deposits over the next 3 years. The Société d'Etudes des Bauxites du Cameroon was investigating the feasibility of developing three remote bauxite deposits. Initial plans focused on developing the Rocher du Loup deposit, located approximately 40 kilometers south of Kribi at an annual production rate of 1 to 2 million tons. The other bauxite deposits were located at N'kongsamba in Littoral Province and

Minim-Martrap in the northern Adamaoua District. Minim-Martrap was estimated to contain 1.4 billion tons of demonstrated reserves and an additional 600 million tons of inferred reserves, grading 43% Al_2O_3 and 3.4% SiO_2. Development of the bauxite resources requires significant infrastructure expenditures, and the total project cost was estimated to be in excess of $1 billion.

Although Cameroon imports bauxite ore from Guinea, domestic ores were determined to be adequate to feed the nation's 80,000-ton-per-year alumina smelter. The $400 billion Edea alumina plant, located near Kribi, was operated by Compagnie Camerounaise de l'Aluminium, a joint venture between the Government (42%) and Péchiney Ugine Kuhlman (France) (58%). Another alumina smelter of similar capacity was being planned for Victoria.

The Société d'Etudes de Fer du Cameroon, a joint venture between the Government (35%) and a consortium of European and U.S. investors (65%), investigated the iron ore resources in the area of Kribi during 1981-82. The only information made public as a result of this study was the iron ore resources estimated figure of 120 million tons.

During June 1982, the Société Anonyme de Broyage de Minerai (SABM), a joint venture between the Government (35%) and Milchem Inc. (65%), was formed. SABM was constructing a 50,000-ton-per-year grinding mill for barite and other minerals used in oil drilling, including bentonite and salt water gel. The company was planning to import barite from Morocco, and other raw materials from Europe. Plans were also made to explore for raw materials locally and to develop export markets for finished products in neighboring countries.

Cement output increased by approximately 6% between 1981 and 1982 owing to extensive modernizations at the Bonaberi and Figiul plants. Approximately 500,000 tons was estimated to be imported, and domestic consumption was expected to continue to increase. Construction of a 400,000-ton-per-year cement plant was being considered at yearend.

Proven crude oil reserves were approximately 400 million barrels, and natural gas reserves were reestimated at roughly 3 trillion cubic feet at yearend. Franlab, a French consulting company, concluded that gas reserves were probably not more than one-half of the original 7-trillion-cubic-foot estimate. Consequently, the decision to construct a $2 billion liquefied natural gas complex at Kribi was delayed. Four marine rigs were in operation at yearend, and additional rigs were expected to be put into operation during 1983, at the newly discovered Victoria and Lokele Oilfields.

The Société de Recherches et d'Exploitation des Petroles du Cameroun, or Elf-Serepca, continued to be the operator of the largest Rio del Rey Oilfield. Elf-Serepca was jointly owned by Société National Elf Aquitaine (SNEA) (France) and Pecten Cameroon Co., a subsidiary of the U.S. Division of Shell Oil Co. in association with the Cameroonian Government. The two new oilfields located offshore of Limbe were undergoing development. The Victoria Oilfield, to be operated by Total Exploration and Production Cameroon and Mobil Production Cameroon Inc., was expected to initially produce 15,000 barrels per day and increase to 25,000 barrels per day by 1984. The Lokele Oilfield north of the Victoria Fields was expected to add another 15,000 barrels per day to production capacity.

The new $230 million Victoria oil refinery was constructed at a maximum capacity of 30,000 barrels per day, with potential to be expanded to 40,000 barrels per day. Initial production was expected to be 15,000 barrels per day, divided among heavy fuel oil (50%), diesel oil (20%), gasoline (14%), kerosine (11%), and refinery fuel (5%). Lubricants and asphalt products continued to be imported.

CENTRAL AFRICAN REPUBLIC

Reported mineral production of diamonds and gold was valued at approximately $21 million. Nearly 50% of the diamonds mined were estimated to be illegally exported. Owing to depressed world markets, reported diamond and gold output declined 11% and 28%, respectively, by volume. Consequently, the mineral sector's contribution to the national economy declined from that of 1981 by nearly 30%.

The GDP has fallen an estimated 5% annually since 1977, to roughly $640 million in 1982. In real terms, the GDP declined by less than 1% during 1982, since double-digit inflation outpaced economic expansion. The balance-of-payments (BOP) situation continued to deteriorate. A trade deficit of approximately $33 million and an overall BOP

deficit of roughly $70 million were estimated.

Despite the identification of uranium, limestone, iron, and copper resources, depressed world markets and the lack of available capital have hindered exploration and development. Private companies including Continental Oil Co. (CONOCO) and Total-Afrique Co. formed joint ventures with the Government to prospect for oil, mostly in the northern part of the country. CONOCO and Shell Oil Co. participated as silent financial partners in prospecting for oil during 1981-82. A series of rate-of-flow drilling tests were scheduled to commence during the 1983 dry season, which runs from January to June. CONOCO has been investigating the areas adjacent to the oil-yielding fields in Chad over the past decade.

The Central African Republic continued to depend on petroleum product imports from European, Middle Eastern, and Caribbean refineries. Total Centrafricaine De Gestion, the joint venture between the Government and Total-Afrique, distributed approximately 600,000 barrels per year of petroleum products from import tankers at Pointe Noire, Congo, and/or Matadi, Zaire, via train to Brazzaville, Congo. Materials were then barged up the Zaire and Ubangi Rivers via the Central African River Transport Co. to the nation's capital city, Bangui.

Table 1.—Other countries of Central Africa: Production of mineral commodities[1]

Country[2] and commodity[3]	1978	1979	1980	1981[p]	1982[e]
CAMEROON					
Aluminum metal, primary ____ metric tons	48,620	43,200	43,160	36,756	37,000
Cement, hydraulic ____ do ____	[e]350,000	489,560	227,071	270,000	290,000
Gold, mine output, metal content ____ troy ounces	[e]200	147	72	[4]316	150
Petroleum, crude ____ thousand 42-gallon barrels	4,700	12,482	20,045	32,000	35,000
Pozzolana ____ metric tons	17,500	NA	NA	53,025	50,000
Stone:					
Limestone ____ do ____	79,180	80,000	39,962	66,625	65,000
Marble ____ do ____	[e]700	665	NA	NA	NA
Tin ore and concentrate:					
Gross weight ____ do ____	[e]20	12	19	15	15
Metal content ____ do ____	14	8	13	10	10
CENTRAL AFRICAN REPUBLIC					
Diamond:					
Gem[e] ____ carats	198,953	220,500	227,000	208,903	186,573
Industrial[e] ____ do ____	85,266	94,500	115,000	103,000	90,000
Total ____ do ____	284,219	315,000	342,000	[e]311,903	276,573
Gold ____ troy ounces	[e]965	2,181	2,000	1,386	1,000
Uranium ore, metal content ____ kilograms	750	1,500	1,500	--	--
CHAD					
Sodium carbonate, natural (natron), slabs (plaques) and broken ____ metric tons	11,000	[e]11,000	8,000	5,000	5,000
CONGO					
Cement, hydraulic ____ do ____	[e]50,000	[e]50,000	34,000	49,298	39,242
Copper, mine output, metal content ____ do ____	800	1,000	1,300	[4]245	149
Gas, natural:					
Gross[e] ____ million cubic feet	7,500	9,000	10,000	13,000	13,000
Marketed ____ do ____	[e]300	350	350	350	350
Gold, mine output, metal content[e] ____ troy ounces	7,000	7,000	7,000	7,000	6,000
Lead, mine output, metal content ____ metric tons	4,235	7,000	7,000	7,682	8,000
Petroleum, crude ____ thousand 42-gallon barrels	4,500	19,546	19,861	30,860	33,000
Potash, crude K_2O equivalent ____ metric tons	--	--	--	--	--
Zinc, mine output, metal content ____ do ____	4,800	[5]	--	--	--

[e]Estimated. [p]Preliminary. NA Not available.

[1]Includes data available through Sept. 1, 1983.

[2]In addition to the countries listed, Equatorial Guinea and São Tomé e Principe, covered textually in this chapter, presumably produce modest quantities of a variety of crude construction materials (clays, stone, and sand and gravel) and may produce minor amounts of other mineral commodities (most notably gypsum, lime, and salt), but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[3]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, stone, and sand and gravel) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[4]Reported figure.

[5]Revised to zero.

CHAD

Sixteen years of civil war have left landlocked Chad in a deteriorated state, both in terms of its infrastructure and its means of production. During November 1982, the United Nations sponsored a Reconstruction Conference on Chad, and approximately $287 million in assistance was pledged from a variety of institutions. The United Nations Development Program (UNDP) has funded approximately $5 million in ongoing projects. Roughly 75% of the aid was allocated for general development, humanitarian aid, and emergency relief. New UNDP project proposals totaled nearly $15 million, and approximately 5% of the aid was targeted for natural resources. Of significance to the mineral industry, UNDP proposed projects included technical assistance for the petroleum sector, a preinvestment study for a cement factory at Mayo-Kebbi, preparation of an industrial development plan, the promotion and use of local building materials (i.e., clay bricks), and logistical support to the trade and transport sectors.

Financial arrangements were being made with the Development Bank of Central African States to resume activities at the Mani stone quarry. Discussions were also taking place between Esso Exploration Co. and CONOCO Chad concerning new exploration ventures and a minirefinery project. Mining in Chad has been restricted to building materials, natron, and petroleum exploration.

CONGO

Although the Congo has mineral deposits of potash, phosphate, lead, zinc, copper, gold, and hydrocarbons, only petroleum has been commercially exploited over the past 5 years. The value of crude oil exports during 1981 was nearly $797 million. Petroleum production increased an estimated 7% between 1981 and 1982, and petroleum tax and royalties comprised roughly 50% of the $750 million national budget. Similarly, oil revenues were projected to comprise 65% of the nation's $2.5 billion, 5-year plan, 1982-86. Owing to falling crude oil prices on a worldwide scale, discussions were being held to revise development expenditures downward in order to stabilize foreign debt payments. As part of the 5-year plan, the manufacture of bricks, lead and zinc pipes, and construction of an ironworks plant were planned.

Other mineral commodities produced on a small scale, including gold, cement, and copper, dropped in excess of 10% from 1981 production. Petroleum, cement, and potash appeared to be the only commercially exploitable minerals by yearend 1982.

The Congo's single cement facility at Loutete improved 1981 production efficiencies after technical assistance was provided by a West German management consultant. However, the facility produced well below its 80,000-ton capacity during 1982.

Initial investigations by French and U.S. companies indicated the possibility of additional carnallite deposits throughout the Bas-Kouilou area.

The Congo's estimated petroleum and natural gas reserves were 1.3 billion barrels and 2.5 billion cubic feet, respectively. The three offshore oilfields—Emeraude, Loango, and Likouala—accounted for the bulk of production. The three other smaller producing fields included Yanga, Koundji, and Pointe Indienne. Production was dominated by the European companies SNEA, Azienda Generali Italiani Petroli S.p.A. (AGIP), and Hydro-Congo. The latter retained the monopoly over national hydrocarbon marketing and distribution. As of late 1982, no exploration drilling was underway, but test drillings were scheduled for 1983.

The National Oil Refinery began test operations during September and officially opened on December 11, 1982. The 1-million-metric-ton facility was designed to produce gasoline, diesel oil, gas, and fuel oils. The nation's first refinery was financed in joint venture between SNEA and Hydro-Congo. The $200 million plant, located at Pointe Noire, was completed by Technip, France, 6 years behind schedule.

The Government continued to support national business investment incentives and infrastructure development expenditures. A new investment code, promulgated on July 7, granted privileged status to indigenous businesses in order to promote Congolization and decentralization policies.

The emphasis of the 1982-86 5-year plan was on infrastructure development. A major expansion project for the Port of Pointe Noire was scheduled for 1984. The port

handled 4 million tons of freight, operating near capacity during 1981. The river port facilities at Brazzaville were underutilized, but increased forestry activity in the northern Congo was expected to raise the traffic level. The Congolese railway handled 3 million tons of freight in 1981, of which 1.5 million was Gabonese manganese ore. Realignment and purchases of new rolling stock during 1982-83 were expected to raise rail capacity considerably. The greatest transport bottleneck continued to be inadequate roads. Work continued during 1982 to connect Brazzaville with Pointe Noire.

Table 2.—Congo: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	--	2	--	All to West Germany.
Copper:				
Matte and speiss including cement copper	--	3	--	All to France.
Metal including alloys, scrap	33	36	--	France 17; Netherlands 12; West Germany 7.
Iron and steel: Metal:				
Scrap	17	24	--	France 18; Egypt 5; Netherlands 1.
Steel, primary forms value, thousands	--	$6	--	All to Zaire.
Semimanufactures:				
Universals, plates, sheets	1	13	--	Mainly to France.
Tubes, pipes, fittings	--	4	--	All to Angola.
Castings and forgings, rough	--	2	--	All to Zaire.
Lead: Ore and concentrate	4,018	2,604	--	All to Switzerland.
Other: Base metals including alloys, all forms value, thousands	$9	$2	--	All to Zaire.
NONMETALS				
Diamond:				
Gem, not set or strung do	$24,587	$37,785	--	Belgium-Luxembourg $26,341; Netherlands $11,444.
Industrial do	--	$648	--	All to Belgium-Luxembourg.
Salt and brine	41	29	--	All to Zaire.
Sodium and potassium compounds, n.e.s.:				
Sodium hydroxide	--	7	--	All to Angola.
Other: Crude	--	5	--	France 4; Italy 1.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	27,826	25,585	3,971	Italy 11,268; Brazil 4,312; Spain 2,635.
Refinery products:				
Gasoline 42-gallon barrels	17	NA		
Kerosine and jet fuel do	63,891	NA		
Lubricants do	252	NA		
Bitumen and other residues do	302,436	NA		

NA Not available.

Table 3.—Congo: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	5	201	--	All from France.
Metal including alloys:				
Scrap, value, thousands	$1	--		
Semimanufactures	42	369	(1)	Cameroon 307; France 30; Netherlands 27.
Chromium: Oxides and hydroxides, value, thousands	$4	$2	--	All from France.
Copper: Metal including alloys, unwrought and semimanufactures	17	19	(1)	France 15; Belgium-Luxembourg 1; United Kingdom 1.
Iron and steel:				
Iron ore and concentrate, value, thousands	$1	--		
Metal:				
Scrap	(1)	--		
Pig iron, cast iron, related materials	6	11	--	West Germany 10; France 1.
Ferroalloys, unspecified	(1)	3	--	All from France.
Steel, primary forms, value, thousands	$1	$6	--	Zaire $5; France $1.
Semimanufactures:				
Bars, rods, angles, shapes, sections	5,530	8,495	2	France 6,754; Belgium-Luxembourg 743; Italy 369.
Universals, plates, sheets	3,953	5,229	4	France 2,218; Japan 2,110; Belgium-Luxembourg 704.
Hoop and strip	232	241	--	France 158; West Germany 78.
Rails and accessories	298	6,474	--	France 6,432; Belgium-Luxembourg 42.
Wire	107	247	--	France 106; Senegal 70; Mozambique 35.
Tubes, pipes, fittings	8,927	17,675	53	France 15,756; West Germany 654; Italy 438.
Castings and forgings, rough	--	15	--	Zaire 9; France 3; Angola 2.
Lead:				
Oxides	13	12	--	All from France.
Metal including alloys, unwrought and semimanufactures	5	4	--	Do.
Manganese: Oxides	7	5	--	Do.
Nickel: Metal including alloys, semimanufactures	(1)	2	--	Do.
Silver: Metal including alloys, unwrought and partly wrought, value, thousands	--	$72	--	France $71.
Tin: Metal including alloys, unwrought and semimanufactures	3	2	--	Mainly from France.
Titanium: Oxides	59	73	--	France 65; West Germany 8.
Zinc:				
Oxides	1	2	--	All from France.
Metal including alloys, unwrought and semimanufactures	9	5	--	Do.
Other:				
Ores and concentrates	--	5	--	Do.
Base metals including alloys, all forms	1	64	--	Do.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc., value, thousands	--	$1	--	Do.
Artificial: Corundum, do.	r$1	--		
Grinding and polishing wheels and stones	20	12	--	France 5; Hong Kong 5; West Germany 2.
Asbestos, crude	1	--		
Barite and witherite	2,043	2,015	--	France 1,675; Morocco 338.
Cement	28,742	48,127	--	Zaire 35,296; West Germany 4,997; France 4,251.
Chalk	205	246	--	France 190; Zaire 35; Cameroon 20.
Clays and clay products:				
Crude, unspecified	986	1,334	365	Spain 530; West Germany 300; Senegal 102.
Products:				
Nonrefractory	557	1,104	--	France 677; Spain 139; Portugal 108.
Refractory including nonclay brick	20	45	--	France 44.

See footnotes at end of table.

Table 3.—Congo: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
NONMETALS —Continued				
Diamond: Gem, not set or strung value, thousands	$104	--	--	
Diatomite and other infusorial earth	67	271	--	France 270.
Fertilizer materials:				
Crude, n.e.s	1	--		
Manufactured:				
Ammonia	17	22	--	France 21; Netherlands 1.
Nitrogenous	1	2,365	--	France 2,357; China 8.
Phosphatic	--	3	--	Cameroon 2; France 1.
Potassic	40	--	--	
Unspecified and mixed	2	4	--	All from France.
Graphite, natural value, thousands	$1	--	--	
Gypsum and plaster	2	3	--	All from France.
Halogens:				
Chlorine	NA	17	--	Do.
Unspecified value, thousands	NA	$2	--	Do.
Lime	137	96	--	France 84; Belgium-Luxembourg 10.
Magnesium compounds: Magnesite	1	1	--	All from Belgium-Luxembourg.
Mica:				
Crude including splittings and waste	--	19	--	All from Netherlands.
Worked including agglomerated splittings value, thousands	$5	$1	--	NA.
Nitrates, crude	--	3	--	All from France.
Pigments, mineral: Iron oxides and hydroxides, processed	14	94	18	France 74; West Germany 1.
Potassium salts, crude value, thousands	--	$3	--	All from Japan.
Pyrite, unroasted	50	--	--	
Salt and brine	6,982	6,139	--	West Germany 2,761; Senegal 2,115; Netherlands 1,177.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	5	1	--	All from France.
Sodium hydroxide	820	2,059	22	France 1,349; West Germany 283; China 100.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	8	5	--	Zaire 3; Japan 2.
Worked	1	22	10	Togo 7; Zaire 5.
Dolomite, chiefly refractory-grade	--	138	--	All from France.
Gravel and crushed rock	2	51	--	Do.
Quartz and quartzite	19	--	--	
Sand other than metal-bearing	--	368	246	France 14; Netherlands 8.
Sulfur: Sulfuric acid	28	76	--	France 50; Netherlands 23; Belgium-Luxembourg 3.
Talc, steatite, soapstone, pyrophyllite	2	96	--	All from France.
Other:				
Crude	3	--	--	
Slag and dross, not metal-bearing	3	2	--	All from France.
Oxides and hydroxides of barium, magnesium, strontium	1	1	--	Do.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	30	161	--	France 149; West Germany 12.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	12	18	--	All from France.
Carbon: Carbon black	--	1	--	Do.
Coal: Briquets of anthracite and bituminous coal	2	50	49	NA.
Coke and semicoke	23	88	--	All from France.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	21,379	83,102	--	France 80,446; Gabon 2,459; Italy 128.
Gasoline do	147,348	279,268	--	Gabon 193,766; Brazil 57,511; Italy 17,646.
Mineral jelly and wax do	63	79	--	Netherlands 47; West Germany 31.
Kerosine and jet fuel do	126,511	345,751	--	Gabon 284,611; Brazil 52,437; Italy 7,711.
Distillate fuel oil do	188,022	481,782	--	Brazil 241,659; Gabon 117,353; Angola 45,707.
Lubricants do	19,208	31,479	84	Saudi Arabia 21,714; France 4,802; Netherlands 2,072.
Residual fuel oil do	28,172	63,696	NA	Gabon 36,883; Angola 26,387.
Bitumen and other residues do	6,793	3,842	--	France 1,891; Spain 1,697.
Tars and other crude chemicals derived from coal, gas, and petroleum	21	27	--	Senegal 20; France 7.

[r]Revised. NA Not available.
[1]Less than 1/2 unit.

EQUATORIAL GUINEA

In April an international donors conference, sponsored by the UNDP and the Equatorial Guinean Government, was held to raise financial pledges for the Government's reconstruction and development program. The UNDP identified the following high-priority project areas, $33 million for agriculture, $33 million for transport and infrastructure, $24 million for water supply and housing, and $20 million for industrial development, mining, and energy.

SÃO TOMÉ E PRINCIPE

The two small islands of São Tomé and Principe were located in the Gulf of Guinea, offshore Equatorial Guinea and Gabon. The islands' mostly agricultural economies continued to rely on assistance from the U.S.S.R., Cuba, and European nations.

A brick factory with annual capacity to produce 19 tons of manufactured clay articles was being planned in São Tomé. Technical and financial assistance was provided by the German Democratic Republic.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Communauté Financière Africaine francs (CFAF) to U.S. dollars at the rate of CFAF367 = US$1.00 for 1982.

The Mineral Industry of Other East African Countries

By Kevin Connor[1]

CONTENTS

BURUNDI

The mineral industry continued to be an almost negligible contributor to the country's economy as the Government continued its 1979 ban on any mineral exploitation for export; a policy initiated at the end of 1979. A national program had been underway since that time to map and inventory all mineral resources so as to permit future exploitation of mineral wealth in the best interests of the country and its inhabitants.

In March 1982, the British Sulphur Corp. Ltd., under contract to the Burundi Government and the International Bank for Reconstruction and Development (World Bank), began a feasibility study of Burundi's phosphate deposits at Matongo-Bandaga for potential commercial exploitation. The 1-year project effort was to define ore reserves, conceptually design mining operations and processing facilities, estimate capital and production cost, and develop a regional market and distribution survey. Work completed during the year comprised geological exploration and reconnaissance and 1,200 meters of core drilling. Reserves in excess of 5 million tons of ore-grade phosphate were estimated available for mining. Rare-earth mineralization was associated with the primary apatite. The associated carbonatite within the rock matrix was preliminarily assessed to be of value as a raw material for the manufacture of cement. The contract effort was valued at $1.2 million.[2] Matongo-Bandaga is located approximately 40 kilometers north of the capital city of Bujumbura and alongside one of the country's few paved roads.

Vanadium deposits, which were delineated through core drilling conducted during the year, looked commercially promising according to a United Nations Development Program (UNDP) report released late in 1982. UNDP-sponsored investigations showed a 100-kilometer-long belt of vanadium-bearing rock extending the width of the country in a north-south direction. Drilling results were given as 5.5 million tons of proven reserves with an average vanadium content of 1.5%. The Finnish mining company Rautaruukki Oy estimated from core sample testing that 85% to 90% of the vanadium was recoverable. More drilling, coring, and lab testing was scheduled for 1983.

In December 1982, Duke University began a second phase of oil exploration and scientific research in Lake Tanganyika. The university-sponsored scientific research team made final preparations to conduct 3 months of seismic experiments to test plate tectonic theory and the origins of the African rift within the lake bottom structure. Data gathered was also scheduled to be analysed for any indications of oil-bearing formations. Both equipment and a specially built research vessel for geologically investigating East Africa's rift lakes was flown to the capital city of Bujumbura early in November. The second-phase project was being funded by a group of 10 multinational oil companies. Aside from the scientific value of the university study to learn more about Africa's ancient climates and geological age, the project was developed out of the promising findings of the phase one efforts concluded in 1981, which showed the possibility of oil and gas deposits under both Lake Tanganyika and Lake Malawi.

Table 1.—Other countries of East Africa: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country and commodity	1978	1979	1980	1981[p]	1982[e]
BURUNDI[2 3]					
Clays: Kaolin	[e]2,750	[e]2,000	2,000	2,000	2,000
Columbium and tantalum ores and concentrates, kilograms	--	2,100	(4)	(4)	--
Gold, troy ounces	[e]450	133	130	100	100
Lime	[e]200	[e]200	200	[4]283	[5]302
Peat	2,000	9,000	9,000	9,500	14,000
Rare-earth metals: Bastnasite concentrate, gross weight	NA	30	(4)	(4)	--
Tin ore and concentrate:					
Gross weight	[e]30	17	(6)	--	--
Metal content	[e]20	8	(6)	--	--
Tungsten, metal content	[e]2	--	--	--	--
ETHIOPIA[2]					
Cement, hydraulic	86,000	92,757	180,000	180,000	180,000
Clays: Kaolin	31,750	30,000	55,235	9,000	9,000
Gold, mine output, metal content, troy ounces	[e]8,000	7,970	9,000	11,930	12,000
Gypsum and anhydrite, crude	932	925	900	4,200	4,000
Petroleum refinery products:					
Gasoline, thousand 42-gallon barrels	782	683	706	798	[5]801
Kerosine and jet fuel, do.	240	210	304	230	[5]466
Distillate fuel oil, do.	1,470	1,095	1,176	1,344	[5]1,493
Residual fuel oil, do.	1,698	2,021	1,598	2,224	[5]2,173
Other, do.	152	114	125	37	[5]129
Refinery fuel and losses, do.	453	265	813	696	[5]548
Total, do.	4,795	4,388	4,722	5,329	[5]5,610
Platinum, mine output, metal content, troy ounces	123	108	113	[e]100	100
Pumice, cubic meters	NA	4,590	1,724	30,300	30,000
Salt:					
Rock[e]	10,000	15,000	15,000	NA	NA
Marine	50,000	92,737	100,000	110,000	110,000
Stone, sand and gravel:					
Limestone	[e]7,000	7,308	1,800	[5]5,500	5,000
Sand, cubic meters	[e]90,000	97,200	407,421	655,000	650,000
Other	[e]280,000	383,940	402,085	1,970,000	2,000,000
LESOTHO[2]					
Diamond:					
Gem, carats	[e]57,332	[e]41,937	[e]42,971	42,000	33,119
Industrial, do.	[e]14,333	[e]10,484	[e]10,743	10,921	9,000
Total, do.	71,665	52,421	53,714	52,921	[5]42,119
Stone[e], cubic meters	[5]25,000	25,000	25,000	25,000	25,000
MALAWI[2]					
Cement, hydraulic, thousand tons	103	103	92	78	[5]53
Gem and ornamental stone: Agate[e]	4	6	7	7	7
Kyanite	100	--	--	--	--
Stone: Limestone	155,229	168,604	122,814	116,118	[5]80,000
MAURITIUS[2]					
Lime	8,000	[e]8,000	7,000	7,000	7,000
Salt	6,000	[e]6,000	6,000	6,000	6,000
Stone: Basalt, not further described	1,154,885	970,000	1,400,000	1,083,500	1,100,000

See footnotes at end of table.

Table 1.—Other countries of East Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1978	1979	1980	1981[p]	1982[e]
MOZAMBIQUE[2]					
Beryllium: Beryl concentrate, gross weight	NA	28	20	20	20
Cement, hydraulic thousand tons	[e]327	273	275	[e]400	400
Coal, bituminous do	118	320	408	[e]450	500
Columbium and tantalum ores and concentrates, gross weight:					
Columbite[e] kilograms	2,300	2,300	NA	NA	NA
Microlite do	39,866	[e]31,750	NA	NA	NA
Tantalite[e] do	36,300	31,750	NA	NA	NA
Copper, mine output, salable ore and concentrate:					
Gross weight	460	1,125	[e]1,000	[e]1,000	1,000
Metal content	130	225	[e]200	[e]200	200
Gem and ornamental stones:					
Beryl crystals kilograms	15	1,920	2,000	[e]2,000	2,000
Garnet do	2,000	11,200	12,000	[e]12,000	12,000
Tourmaline do	25	NA	NA	NA	NA
Lime, hydraulic[e]	10,000	10,000	10,000	10,000	10,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	510	336	510	[e]470	NA
Kerosine and jet fuel do	296	282	330	[e]310	NA
Distillate fuel oil do	634	1,668	746	[e]670	NA
Residual fuel oil do	1,132	236	1,332	[e]1,200	NA
Other do	85	227	323	[e]80	NA
Refinery fuel and losses do	270	128	130	[e]100	NA
Total do	2,927	2,877	3,371	[e]2,830	NA
Salt, marine[e]	28,000	28,000	28,000	28,000	28,000
RWANDA[2]					
Beryllium: Beryl concentrate, gross weight	58	46	108	59	[5]69
Columbium and tantalum ores and concentrates:					
Columbite-tantalite, gross weight	48	47	60	57	[5]62
Gas, natural:					
Gross million cubic feet	7	--	--	--	--
Marketed do	7	--	--	--	--
Gold, mine output, metal content troy ounces	1,125	472	944	[5]1,200	[5]286
Lithium minerals: Amblygonite[e]	28	28	30	NA	--
Tin:					
Mine output, metal content	1,502	[r]1,351	1,464	[5]1,266	[5]1,171
Smelter output, metal content	--	--	--	--	[5]908
Tungsten, mine output, metal content	385	505	431	[5]354	[5]409
SEYCHELLES[2]					
Guano	5,505	[7]6,583	[7]4,285	[e]4,500	4,500
SOMALIA[2]					
Salt, marine[e]	2,000	30,000	30,000	30,000	30,000
Sepiolite, meerschaum	--	--	--	--	[5]9
SWAZILAND[2]					
Asbestos: Chrysotile	36,957	34,294	32,833	35,264	[5]26,413
Coal: Anthracite	165,874	168,409	175,984	163,780	[5]98,135
Iron ore, direct-shipping-grade, gross weight thousand tons	1,266	--	--	--	--
Stone: Quarry product cubic meters	452,494	247,090	74,045	82,053	[5]90,763
Tin, mine output, metal content	1	--	--	--	--
TANZANIA					
Cement thousand tons	231	280	300	380	400
Clays:					
Bentonite	20	80	80	50	50
Kaolin[e]	1,000	1,100	1,100	750	750
Coal, bituminous[e]	3,500	900	1,000	1,000	1,000
Diamond[8] carats	281,788	313,551	273,705	[e]250,000	250,000
Gem stones, precious and semiprecious excluding diamond:[9]					
Amethyst kilograms	4	28	48	NA	NA
Aquamarine do	--	NA	533	560	NA
Beryl (gem only) do	--	2	([e])	NA	NA
Chrysoprase and opal do	23	2	([e])	12	[5]12
Corundum (gem only) do	--	6	[e]7	NA	NA
Garnet and rhodolite do	3	37	9	13	[5]13
Ruby and sapphire do	([e])	20	10	NA	NA
Scapolite do	--	9	[e]10	NA	NA

See footnotes at end of table.

Table 1.—Other countries of East Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1978	1979	1980	1981[p]	1982[e]
TANZANIA —Continued					
Gem stones, precious and semiprecious excluding diamond[9] —Continued					
Tourmaline ---------- kilograms	(6)	5	2	NA	NA
Zircon ---------- do	(6)	5	3	NA	NA
Zoisite (tanzanite) ---------- do	11	10	2	NA	NA
Unspecified ---------- do	21	--	9	NA	10
Gold, refined ---------- troy ounces	133	322	246	NA	250
Gypsum and anhydrite, crude ----------	20,206	9,430	e11,300	e12,000	12,000
Lime, hydrated, and quicklime ----------	5,128	6,111	e6,500	e6,800	6,800
Mica, sheet ----------	6	6	e10	5	5
Nitrogen: N content of ammonia ----------	NA	5,000	e5,000	e6,000	6,000
Petroleum refinery products:					
Gasoline ---------- thousand 42-gallon barrels	794	781	e780	e800	e800
Kerosine ---------- do	328	292	e300	e300	e300
Jet fuel ---------- do	173	244	e240	e220	e220
Distillate fuel oil ---------- do	978	976	e1,000	e1,050	e1,050
Residual fuel oil ---------- do	1,573	1,710	e1,700	e1,750	e1,750
Liquefied petroleum gas ---------- do	63	78	e80	e80	e80
Refinery fuel and losses ---------- do	310	300	e300	e300	e300
Total ---------- do	4,219	4,381	4,400	e4,500	e4,500
Salt, all types ----------	21,100	37,078	e40,000	e41,000	41,000
Tin, mine output, metal content ----------	9	10	e10	9	9
UGANDA					
Bismuth, mine output, metal content[e] kilograms	1,000	5,000	NA	NA	NA
Cement, hydraulic ----------	e80,000	50,000	10,000	e30,000	20,000
Columbium and tantalum ores and concentrates, gross weight[e] ---------- kilograms	e 2,058	2,260	--	--	--
Copper, mine output, metal content ----------	--	--	--	--	1,400
Iron and steel: Steel, crude ----------	15,000	--	--	--	--
Lime, hydrated and quicklime[e] ----------	25,000	28,000	15,000	15,000	15,000
Phosphate minerals: Apatite ----------	5,000	--	--	--	--
Salt, evaporated[e] ----------	500	500	515	20,000	20,000
Tin, mine output, metal content[e] ----------	120	60	30	30	30
Tungsten, mine output, metal content ----------	110	20	20	20	20

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through Sept. 8, 1983.

[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, stone, and sand and gravel) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[3]Limited quantities of other pegmatite minerals may also be produced, but output is not reported.

[4]Revised to zero.

[5]Reported figure.

[6]Less than 1/2 unit.

[7]Data represent sales; actual production is not reported.

[8]Diamond figures are estimated to represent 50% gem-quality and 50% industrial-quality stones.

[9]Exports.

DJIBOUTI

Djibouti, the former French Territory of Afars and the Issas, remained a minerally poor nation in 1982. Mineral production was limited to locally used construction materials and evaporated salt. Under development study was an Iraq-sponsored cement plant project, proposed to be located near limestone deposits outside the city of Ali-Sabieh. With assistance from Italy, France, and the United States, geothermal field and laboratory studies continued on utilization of geothermal power from the Lake Assal area. The cost-benefit feasibility of constructing an electrical generating station above the steam reserves was being investigated.

ETHIOPIA

Affected by severe drought and continuing civil strife, Ethiopia's economy was in a state of stagnation in 1982. However, some portions of the mineral industry did show developmental progress. The Ethiopia-Libya Mining Co. invited engineering firms to submit proposals for a feasibility study of potash mining prospects in the Danakil

Depression in northern Ethiopia. Based on geological studies conducted in the early 1970's, the Danakil Depression has measured high-grade reserves of 60 million tons of potash with indicated reserves estimated at 150 million tons. Proposal evaluations were almost completed in late 1982, and a contract for the study was expected to be awarded by the spring of 1983.

With financial and technical assistance from the German Democratic Republic, work continued throughout the year on the construction of the Mugher cement factory in the Shoa administrative region of the country. The project, begun in 1980, was scheduled for completion in 1984. The projected final cost of constructing the 300,000-ton-per-year plant was $31.4 million.[3] Expansion work at the existing cement manufacturing facilities at Dire Dawa was expected to be completed in 1983, with assistance from the Soviet Union.

In September 1982, the Chevron Oil Co. signed an oil exploration agreement with the Ethiopian Government to explore for petroleum in the country's western-most Provinces of Illubator and Wollega. These two areas were adjacent to oilfields discovered by Chevron in southern Sudan, and it was a Chevron supposition that the oilfields might extend into Ethiopia. By yearend, a high-resolution aerial survey had been completed, and plans for a gravity study had been drawn up. The gravity study, which would require 2 to 3 months to complete, was scheduled to begin in late January of 1983. In 1982, Ethiopia imported its entire supply of petroleum from the Soviet Union, which amounted to approximately 800,000 tons of crude, and then refined it at the country's sole petroleum refinery at Assab.

A geothermal steam resources project to evaluate the indigenous potential for fueling a powerplant in the Lakes District area, southwest of Addis Ababa, continued throughout the year. The project was funded jointly, through yearend, by the UNDP and the European Economic Community (EEC). Outlined in the project's workplans were nine exploratory drill holes to delineate the geothermal resources of the area. However, only two of the holes had been completed by yearend. Other areas of Ethiopia were also thought to be geothermally promising, and with additional funding expected from UNDP and EEC in early 1983, the project was slated for expansion and extension through the 1985 calendar year.

LESOTHO

With the closure of the Letseng-la-Terai diamond operation in fall of 1982, Lesotho had no active mining operations at yearend. The Lesotho Government and De Beers Consolidated Mines Ltd. of South Africa concluded the closure agreement for the operation in May, and all mining was suspended immediately. However, the operation's processing plant continued with treatment of stockpiled ore and did not shut down until late October. During the 10 months of the year that the Letseng complex was in operation, a total of 1.4 million tons of ore was treated to yield slightly over 42,000 carats at an average grade of approximately 2.95 carats per hundred tons. This rate of recovery was comparable with the 1981 annual production of almost 53,000 carats recovered from the treatment of 1.9 million tons of ore. Completion of final cleanup operations was expected by January 1983.

MALAWI

The Malawian economy showed virtually no growth in real terms in 1982, marking the third consecutive year of economic stagnation. Cement production by Portland Cement Co. Malawi Ltd. fell for the third straight year, reportedly owing to supply problems of coal necessary to the operation of the plant facilities. Imports of almost 30,000 tons of cement were necessary to cover shortfalls experienced in the country. The associated limestone production quarried was also 30% less than that of 1981, with the final total slightly less than 80,000 tons. Problems obtaining coal from neighboring Mozambique stimulated additional interest by the Government in pursuing a pilot-scale program for mining the Ngama Coalfield. Based on drilling completed in 1981, 9 million tons of indicated reserves was estimated. Also during the year, the Malawi Geological Survey Department (MGSD) began investigations on the Livingstonia Coalfield.

Hunting Geology and Geophysics Ltd. carried out an aeromagnetic survey over Lake Malawi and portions of the Shire

Valley under a reconnaissance agreement with Shell Oil Co. of the United States. The survey showed three substantial sedimentary basins, one possibly 4,000 meters thick, under Lake Malawi. Even though the information increased the chances of oil and gas below the lake, the fact that the basins were all located below 500 meters of water led Shell to relinquish its option to negotiate further exploration licenses.

In other areas, a subsidiary of British Gypsum Ltd. exported a trial shipment of lump kyanite to the United Kingdom from the Kapiridimba area and continued with its pilot-scale production project of vermiculite from the extensive deposits at Kapirikamodzi, in the Mwanza District. Union Carbide Corp. submitted to the Malawian Government the results of research carried out in 1981 under three reconnaissance licenses. The research investigations, which were around the Lower Paleozoic Lake Malawi Granites, led to the discovery of significant tin anomalies and the first reported occurrence of tungsten within the country. MGSD finished its assessment of the glass sands at Mchinji and the kaolin clay deposits of Linthipe, and in both cases reported sufficient mineral quality and quantity to support proposed glass and ceramic industries.

MAURITIUS

Mauritius, an island located about 800 kilometers east of Madagascar, remained basically an agricultural nation with sugar production accounting for two-thirds of the country's export earnings for the year. Mineral production on the island was limited to stone and gravel quarrying for local construction, along with small lime- and salt-producing operations, which also supplied domestic markets. A small diamond-cutting operation using imported rough gem stones operated on the island during the year, and a portion of the firm's production of precious and semiprecious gems was exported to the United States. A program was begun to evaluate the island's rivers for hydroelectric potential. Another project was under development to study the potential for generating electricity using waste sugar cane stocks as fuel. Both of these efforts were a direct result of Government concern over petroleum import costs, which absorbed 16% of the country's export earnings for the year.

MOZAMBIQUE

A shortage of foreign exchange and civil strife continued to hamper the Mozambican economy, which overall showed little developmental progress for the year. Production estimates for mineral industry commodities showed no growth over the previous calendar year, although notable progress was registered in project planning for mineral developments for 1983 and beyond. The national coal company, Carbonifera de Mozambique, announced plans for the development of four new mines at Moatize in the northwestern Province of Tete, near the Zimbabwe border. Like existing operations in the area, three of the planned operations would be underground, while the fourth would be a pilot-scale opencast mine intended to evaluate the feasibility of surface mining for the area. An undisclosed portion of the necessary funding for these expansion projects was to be supplied by the Federal Republic of Germany.

Besides further developing the coalfields of Moatize, the Mozambican Government had plans to negotiate with foreign petroleum companies on exploration rights for the Rovuma Basin in the first half of 1983. The basin area located onshore in northeast Mozambique near the Tanzania border was shown to be the most promising of the country's exploration areas by the aeromagnetic survey work completed in 1981 by Compagnie Generale de Geophysique. The survey clearly distinguished a large sedimentary basin, with sedimentary thickness of up to 10,000 meters in some places. Late in 1982, the Government was also making final preparations to facilitate the bidding for petroleum exploration rights on 17 offshore blocks covering the country's entire Continental Shelf. Interested companies would be allowed to negotiate production-sharing contracts on a block-by-block basis. Block sizes were to be either 5,000 or 10,000 square kilometers. Offshore seismic survey work on the shelf was conducted and completed in midyear. No oil or gas exploration drilling has been conducted in Mozambique since the country's independence in 1974, although efforts prior to that time led to the

location of an estimated 57 billion cubic meters of gas reserves in the Pande, Buzi, and Temane areas. Fluor Corp. was awarded a contract during 1982 to conduct a feasibility study on a gas-fed ammonia and urea fertilizer plant based on exploitation of the Pande Field.

A 50-hectare saltpan, which had begun test operations late in 1981, continued throughout the year at Nova Mambone on the coast of the southern Province of Inhambane. The pan, which was built with assistance from North Korea, was expected to reach an output of 7,500 tons per year in 1983, at which time the project was expected to be fully operational. Also during 1982, the Government of Mozambique was considering a proposal, which included financing from the Italian Government, to build an aluminum smelter, refinery, and fabrication plant at Maputo. Operating on imported alumina, the operation was to produce up to 150,000 tons of ingots, with approximately 15% being processed into semifinished and finished products for the domestic market. The remainder of the aluminum ingots would be exported.

REPUBLIC OF COMOROS

No commercially exploitable minerals were yet discovered in the Republic of Comoros, an archipelago situated in the Mozambique Channel off the southeast coast of Africa. Of the four major islands, politically, three of them were composed as an independent republic, while the fourth, Mayotte, was a French territorial community. The agricultural production of ylang-ylang, vanilla, copra, and cloves remained the archipelago's major export commodities. Virtually all mineral-related needs were imported. Mineral production on the islands was almost negligible with only small sand and gravel pits known to have been in operation. The islands have geothermal potential, which was under study for possible use as an energy alternative to costly imported petroleum fuels.

REUNION

The economy of Reunion, an island in the Indian Ocean approximately 640 kilometers east of Madagascar, continued to be heavily dependent on the agricultural sector, primarily sugar. Trade revenues from this commodity were slightly over $80 million.[4] Reported mineral activity on the island was limited to the operation of a 200,000-ton-per-year cement clinker grinding facility at Saint Denis, which manufactured cement mix from imported materials. Construction work began during midyear on the new harbor and port facilities in the Bay of Possession. The project, estimated to cost over $100 million, was scheduled for completion in 1985. The island, which was reported to have a population of slightly over 520,000 people as of July 1982, remained an overseas department of France.

Table 2.—Reunion: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	41	39	--	France 38; Republic of South Africa 1.
Copper: Metal including alloys, scrap	215	162	--	All to France.
Iron and steel: Metal, semimanufactures:				
Bars, rods, angles, shapes, sections	324	104	--	All to Comoros.
Universals, plates, sheets	72	21	--	Do.
Wire	1	1	--	Do.
Tubes, pipes, fittings	40	45	--	Comoros 43; Madagascar 2.
Castings and forgings, rough	2	(1)	--	All to France.
Lead: Metal including alloys:				
Scrap	160	101	--	Republic of South Africa 89; France 12.
Semimanufactures	NA	1	--	All to Comoros.

See footnotes at end of table.

Table 2.—Reunion: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought value, thousands	--	$1	--	All to Seychelles.
Tin: Metal including alloys, semimanufactures do	$6	--		
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones do	--	$2	--	France $1; Madagascar $1.
Cement	720	6,390	--	Madagascar 6,300; Comoros 90.
Chalk	3	--		
Clays and clay products: Products:				
Nonrefractory	9	41	--	Comoros 38; Mauritius 3.
Refractory including nonclay brick	(1)	1	--	All to Comoros.
Fertilizer materials: Manufactured	--	29	--	Mauritius 18; Comoros 11.
Lime	10	7	--	All to Comoros.
Pigments, mineral: Iron oxides and hydroxides, processed	--	1	--	Mainly to Mauritius.
Precious and semiprecious stones other than diamond value, thousands	$2	--		
Stone, sand and gravel: Dimension stone, worked	5	--		
Sulfur: Sulfuric acid	1	1	--	All to Comoros.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	19	24	--	Mauritius 15; Comoros 9.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black value, thousands	--	$1	--	All to Comoros.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	441	487	--	Comoros 394; Andorra 69; France 23.
Gasoline do	--	8	--	All to Comoros.
Lubricants do	--	980	--	Comoros 959; Mauritius 21.
Bitumen and other residues do	10,763	212	--	Madagascar 194; Comoros 18.

NA Not available.
[1]Less than 1/2 unit.

Table 3.—Reunion: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkali, alkaline- and rare-earth metals	--	1	--	All from France.
Aluminum: Metal including alloys, semimanufactures	292	254	--	France 191; Sweden 55; Republic of South Africa 3.
Chromium: Oxides and hydroxides value, thousands	--	$1	--	All from France.
Copper: Metal including alloys, semimanufactures	115	150	--	France 128; Belgium-Luxembourg 11.
Iron and steel: Metal:				
Scrap	11	--		
Pig iron, cast iron, related materials	50	2	--	All from France.
Steel, primary forms	173	43	--	Mainly from West Germany.
Semimanufactures:				
Bars, rods, angles, shapes, sections	12,491	13,970	--	France 11,203; Republic of South Africa 1,295.
Universals, plates, sheets	11,424	12,792	--	France 10,463; Republic of South Africa 1,339.
Hoop and strip	46	66	--	All from France.
Rails and accessories	13	31	--	Do.
Wire	289	430	--	Republic of South Africa 216; France 202.
Tubes, pipes, fittings	5,680	4,992	--	France 4,149; West Germany 308; Republic of South Africa 283.
Castings and forgings, rough	275	519	--	Mainly from France.

Table 3.—Reunion: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides and hydroxides	10	(1)	--	All from France.
Metal including alloys:				
Unwrought	1	(1)	--	Do.
Semimanufactures	17	10	--	Do.
Mercury 76-pound flasks	29	(1)	--	Do.
Nickel: Metal including alloys, semimanufactures -- value, thousands	$2	$4	--	All from West Germany.
Platinum-group metals: Metals including alloys, unwrought and partly wrought do	--	$1	--	All from France.
Silver: Metal including alloys, unwrought and partly wrought do	$14	$34	--	Do.
Tin: Metal including alloys:				
Scrap do	--	$4	--	Do.
Unwrought and semimanufactures	1	7	--	Do.
Titanium: Oxides and hydroxides	189	180	--	All from United Kingdom.
Zinc:				
Oxides and hydroxides	4	8	--	All from France.
Metal including alloys, semimanufactures	2	4	--	Do.
Other: Base metals including alloys, all forms value, thousands	$11	$24	--	Do.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	30	1	--	Mainly from France.
Grinding and polishing wheels and stones	23	28	--	France 23; Japan 2; Italy 1.
Asbestos, crude	--	1	--	Mainly from West Germany.
Barite and witherite	--	20	--	All from France.
Cement	181,715	129,926	--	Kenya 72,557; Republic of South Africa 57,144.
Chalk	1,137	1,127	--	All from France.
Clays and clay products:				
Crude	135	113	--	France 102; Republic of South Africa 6; Japan 5.
Products:				
Nonrefractory	8,243	8,037	--	Italy 4,727; France 1,884; Spain 909.
Refractory including nonclay brick	974	654	--	France 644; Spain 10.
Diamond: Gem, not set or strung value, thousands	$93	$110	--	France $106; India $4.
Diatomite and other infusorial earth	40	43	--	All from France.
Fertilizer materials:				
Crude, n.e.s	26	--		
Manufactured:				
Ammonia	8	11	--	All from France.
Nitrogenous	2,819	2,166	--	Belgium-Luxembourg 1,367; Netherlands 500; Mauritius 250.
Phosphatic	543	703	3	France 700.
Potassic	204	--		
Unspecified and mixed	28,440	32,226	19	Netherlands 13,419; Italy 12,807; France 4,682.
Gypsum and plaster	10,263	4,600	--	All from France.
Halogens:				
Chlorine	30	19	--	France 17; West Germany 2.
Unspecified value, thousands	$6	$1	--	All from France.
Lime	1,260	1,609	--	Do.
Magnesium compounds: Magnesite	248	208	--	All from Netherlands.
Mica: Crude including splittings and waste	10	10	--	All from France.
Phosphates, crude	--	30	--	All from Republic of South Africa.
Pigments, mineral: Iron oxides and hydroxides, processed	89	33	--	West Germany 29; France 4.
Precious and semiprecious stones other than diamond -- value, thousands	$106	$75	--	France $42; Australia $14; Madagascar $7; Thailand $7.
Salt and brine	2,170	2,690	--	West Germany 1,292; Republic of South Africa 921; Madagascar 379.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	1	2	--	All from France.
Sodium hydroxide	260	209	--	France 200; West Germany 6.

See footnotes at end of table.

Table 3.—Reunion: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	(1)	--	--	
Worked	204	206	--	Italy 101; France 99; Madagascar 3.
Gravel and crushed rock	14	--	--	
Sand other than metal-bearing	122	187	--	All from France.
Sulfur:				
Elemental:				
Crude including native and by-product-- value, thousands	--	$1	--	Do.
Colloidal, precipitated, sublimed	2	8	--	Do.
Sulfuric acid	116	72	--	Do.
Talc, steatite, soapstone, pyrophyllite	22	27	--	Do.
Other:				
Crude	--	34	--	France 33; Norway 1.
Slag and dross, not metal-bearing	12	(1)	--	All from France.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	3,187	1,389	--	France 1,387; Tunisia 2.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	40	--		
Carbon: Carbon black	1	2	--	All from France.
Coal: All grades excluding briquets	--	2	--	Do.
Briquets	3	--		
Coke and semicoke	--	1	--	All from Netherlands.
Peat including briquets and litter	(1)	2	--	France 1; Norway 1.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	158,201	127,890	--	Singapore 112,253; Bahrain 15,312.
Gasoline do	3,145	587,052	--	Bahrain 463,097; Yemen (Aden) 121,992.
Mineral jelly and wax do	142	8	--	All from France.
Kerosine and jet fuel do	227,873	251,480	--	Bahrain 201,260; Yemen (Aden) 50,212.
Distillate fuel oil do	30	416,193	--	Bahrain 326,427; Yemen (Aden) 89,662.
Lubricants do	21,644	21,707	63	France 12,789; Republic of South Africa 8,204.
Residual fuel oil do	108,345	32,341	--	Madagascar 18,974; Kuwait 13,367.
Bitumen and other residues do	54,516	55,752	--	Republic of South Africa 55,364; France 388.
Bituminous mixtures do	594	818	--	All from France.
Tars and other crude chemicals derived from coal, gas, and petroleum	10	9	--	Do.

[1]Less than 1/2 unit.

RWANDA

Rwanda's main sources of export revenue, coffee, tea, and minerals, continued to be subjected to falling world commodity prices. With export earnings down, the country's budget deficit increased 30% to $23 million by yearend.[5] Mineral production totals for beryl, columbium-tantalum, tungsten, gold, and tin remained at approximately the same output levels as 1981 final figures, while export trading of minerals was estimated to have declined appreciably.

The national tin-mining company, Société Minière du Rwanda, which completed its 3,000-ton-per-year smelting operations plant in Kururuma in 1981, operated without major interruption throughout 1982 and produced 908 tons of tin ingots. Rwandan officials had estimated that remaining measured and indicated tin ore reserves in the country were approximately 20,000 tons. Preliminary planning continued on the construction of an iron foundry at Kigali, exploitation of methane gas deposits located under Lake Kivu in cooperation with Burundi and Zaire, and production of 10,000 tons per year of lime at Ruhengeri.

As part of the Rwandan Government's development plans, emphasis continued to be placed on transportation infrastructure. Negotiations neared final stages for construction of a railway between Rwanda and Tanzania, to be built with Chinese assist-

ance. Also, a 150-kilometer asphalt road between the city of Butare in southern Rwanda and Zaire was approved with $8 million in financing provided by the Arab Bank for Economic Development.

SEYCHELLES

In general, the state of the Seychelles economy was repetitious of 1981 recessional conditions, although upturns in the important agricultural export trade and tourism were underway in the last half of the year. Early in 1982, U.S. AMOCO signed an exploration agreement with the Seychelles Government to conduct regional aeromagnetic and seismic surveys along approximately 27,000 kilometers of ocean floor. The company's first exploration program, which ended in 1981, had searched for oil with three subsequently dry wells drilled off the main island of Mahe in the Owens and Topaze Banks. Based on analysis of the aeromagnetic surveys completed in July 1982, plans were being made late in the year for seismic testing to begin in the spring of 1983 off the coast of the Farquhar Islands, a group of small islands located at the southern tip of the Seychelles chain. The only other mineral-related activities on the islands in 1982 were small sand and gravel operations for local construction, and collection and processing of guano for use domestically as fertilizer.

SOMALIA

Somalia's economy changed little during the course of the year, with livestock raising contributing 80% of the country's export earnings and employing 70% of the working population. To alleviate the high cost of petroleum imports for energy-related uses, the Government continued to promote and support petroleum oil exploration and hydroelectric dam development projects within the country. With Chinese assistance, the small 6-megawatt hydroelectric dam project at Fanole was completed in October.

Commercial mining operations were limited to the extraction of meerschaum from deposits in the Mudugh region near El Bur. The material, as mined in previous years, was low-density, high-porosity sepiolite. Exports to the United States and other Western markets were estimated at 9,000 kilograms. Work continued throughout the year on the new 200,000-ton-per-year, dry-process cement plant at Berbera. Lafarge Conseils et Etudes, a division of the French company Lafarge Coppee Corp., was handling the engineering work, and plant equipment was being supplied by the French firm Creusot Loire S.A. Completion of the project, which would be Somalia's first cement plant, was scheduled for late 1983. A second cement manufacturing facility, to support the planned 10-megawatt Bardera Dam construction project on the Jaba River, was estimated to cost $93 million to build and would have a projected output of 250,000 tons per year product.[6] Financing for the plant was expected to come from the Italian Government, and a contract to build the facility was awarded to the Italian consortium of Cogefar, Dravo Construttori, Italeementi, and the Franco Tosi Co.

In September 1982, the Government of Somalia solicited applications for petroleum exploration permits on unconcessioned areas of the country. During the reported year, almost one-half of the nation's 640,000 square kilometers was under concessional contract to five international oil companies and consortia. Oil exploration efforts began in Somalia in 1974, and as of yearend 1982, approximately 60 wellholes had been completed without commercial success. The deepest exploratory drilling for petroleum in Africa to date had occurred in Somalia with completion depths of 5,000 meters being reported by Atlantic Richfield Co. (Arco) in 1980 and Deutsche Texaco in 1981 and 1982. During the month of August, through a partnership arrangement between Arco and Exxon Corp., a new offshore drilling project began some 200 kilometers northeast of the capital of Mogadishu. An exploratory drill hole to a maximum depth of 3,700 meters was planned.

SWAZILAND

Asbestos remained the main mineral-related foreign exchange earner in 1982. Output from the country's sole operation, the Havelock Asbestos Mines, declined approximately 25% from the 1981 level of production owing mainly to poor market conditions. The operation remained profitable as approximately 26,000 tons of product valued at slightly less than $14 million was traded.[7] The Havelock Mine's capacity was rated as 2,800 tons per day of ore, processed into 120 tons per day of asbestos fiber. The mine's reserves were still considered sufficient for several more years of operations at 1982 production levels. As in previous years, the country's coal production was limited to the Anglo-American Corp.-controlled Mpaka Colliery, which produced slightly under 100,000 tons for the year, valued at $2.4 million. This was a 40% decrease from 1981 production and was attributed to a combination of transportation and marketing problems. The possibility of increasing the future output from the Mpaka Mine was stated to be conditional on the improvement program underway for the railway line to the Mozambican Port of Maputo, through which Swaziland's coal was exported to Kenya, the Republic of Korea, and Mozambique.

A consortium of Italian railway equipment companies was carrying out modernization work on the Machava-Matsapa section of the railway at an estimated cost of $42 million, and a Swedish company, Swederail, was commissioned to do a feasibility study on electrification of the railway system. Some of the coal produced in 1982 was used to power the railway locomotives and to fuel two small coal-fired powerplants. Still under consideration by Shell Coal Swaziland was an 800,000-ton-per-year anthracite mine to be located in the Mhlume area in northeast Swaziland. The coal resources of the country were estimated at slightly less than 2 billion tons of economically recoverable steam-grade product and appeared to be the country's mineral resource with the greatest long-term potential. Other companies that were showing interest in exploiting Swaziland's coal were the Korean Coal Corp., the South Korean industrial group—Daewoo Heavy Industries Ltd., and Intercoal Mining & Trading Corp. of Switzerland.

TANZANIA

Tanzania's economy continued to be heavily reliant on agricultural production, with 90% of the working population engaged in farming and over two-thirds of all export earnings derived from agricultural sales. Mineral production of diamonds remained Tanzania's major export product from the minerals sector during the year with rough and polished diamond sales accounting for almost 8% of the country's foreign exchange earnings of $370 million.[8] As in previous years, minor amounts of gold, tin, and mica were exploited for export, and gypsum, lime, salt, and cement were produced for domestic consumption. There were several metal and nonmetal mines in various development stages, with some starting production and some still in planning and construction stages.

The Buck Reef gold mine in the Geita District began production in October and had recovered approximately 550 troy ounces of gold by yearend. The Minjingu phosphate mine also began production operations late in 1982 and was expected to produce 100,000 tons of concentrates during 1983. The mine production was expected to be used for feedstock at the Tanga fertilizer complex, which had been importing concentrates from abroad. The Kone Corp. of Finland and the Finnish Government were the financial backers of the Minjingu operation in 1982. Planning continued on a project to further delineate the coal reserves at the existing Ilima Mine and to continue with exploration of the Kabulo Ridge area, which according to a 1980 survey, contained up to 20 million tons of coal reserves amenable to open pit mining. Financial assistance for the project was being sought from the World Bank. The Mbeya cement factory, which was completed in early 1981, was expected to begin producing cement early in 1983. The 2-year startup

delay was caused by a lack of electrical power to operate the plant's equipment. The factory's power requirement of 7.5 megawatts was to be supplied from a 10-megawatt power station completed in mid-1982 in Mbeya. The cement factory's production capacity was estimated at 250,000 tons per year.

Tanzania's governmental agency for mineral development, the State Mining Corp. (Stamico), was also well into the planning stages for expanding the country's output of both kaolin clay and tin. Pugu Kaolin, a mine on the periphery of Dar-es-Salaam, was expected to double its production to 8,000 tons per year of kaolin by 1985, with the majority of the high-quality clay destined for export. Based on feasibility study work done by the Finns in the 1970's, Stamico had nearly finalized plans at yearend 1982 for initiating a tin-mining operation in the Kyerwa Karagwe District of the Kagera region. Financial assistance and machinery from the United Kingdom were expected to be supplied in early 1983 to get the operation underway. Stamico also announced plans during the year to begin development in 1983 of four new salt-producing facilities, to be located on the coast at Changwahela, Kitame, Lindi, and Mtwara. Salt production in 1982 from existing operations was 41,000 tons, while domestic demand was estimated at 100,000 tons per year.

Sizable gas reserves have been found off the coast of Tanzania since 1973; however, no commercially viable quantities of petroleum oil had been discovered as of yearend 1982. In October, a Canadian drilling ship, working under a $27 million grant from Petro Canada International Assistance Corp., began drilling an exploration well southeast of Dar es Salaam. Seismic data used to select the site was supplied by the Tanzania Petroleum Development Corp. Other petroleum companies involved in petroleum exploration were Sonatrach, Azienda Generali Italiana Petroli S.p.A., AMOCO, International Energy Development Corp., and Shell Oil. In early 1983, an exploration agreement between the Tanzanian Government and Société Nationale Elf Aquitaine was expected to be signed.

UGANDA

The Ugandan economy showed considerable progress under its Recovery Programme in 1982, as agricultural production increased markedly and the gross domestic product for the country grew by 7.5%. Only minor progress was made during the year regarding revitalization of Uganda's mineral industry, owing to the Government's assigned modest priority to the mineral sector. Because of the continued depressed world minerals market, the Government did not emphasize mineral-related export projects. However, both cement and phosphate production projects were emphasized because of their intrinsic value to the country's large construction and agricultural recovery projects. Plans to set up a National Mining Corp. (NAMICO) remained in the formulation stage throughout the year. NAMICO needed to be enacted by legislation and approved by the National Assembly, which was postponed at least until 1983.

The Kilembe copper-cobalt mine continued to operate on a minimal care-and-maintenance basis. Some production of copper concentrates occurred sporadically through the mill's 30-ton-per-hour extension circuit, but the main 90-ton-per-hour milling circuit remained totally inoperative owing to a lack of needed equipment parts. Production of copper concentrates was slightly over 2,000 tons for the year. The smelter, which is located at Jinja near the Owen Falls power station, did not produce any blister copper as the plant's electric furnace remained dismantled. In July, the British Petroleum Corp. subsidiary, Seltrust Engineering, began a feasibility study for rehabilitation of the mines, mill, and smelter. The study's findings were scheduled for completion and submission to the Ugandan Government early in 1983. The effort was funded through a loan from the European Investment Bank. The proposed cobalt project, which was being studied by Sherritt Gordon Mines Ltd. of Canada, was discontinued because of lack of funding.

Under a $4 million credit from the International Development Agency, the Florida-based Bearden Potter Corp. began engineering studies in 1982 on developing a phosphate fertilizer industry utilizing the Sukulu phosphate deposits.[9] A fertilizer factory operated by Tororo Industrial Chemicals and Fertilizer Co. was located there but ceased production operations in the early 1970's. Revitalization of the Kilembe Mine was considered an important factor to this project, as the mine's waste sulfuric acid component could be used in manufacturing

the phosphate fertilizers.

As of the end of 1982, no salt production had been reported from the Lake Kature salt project, which was prematurely commissioned in December 1980. However, a cooperative agreement was signed with the Federal Republic of Germany in April 1982 for a $4.5 million loan and technical assistance to modify the plant for production of table salt.

The Hima cement plant, located in western Uganda, underwent major repairs. The plant's phase-two circuit was put into production and was producing at a rate of 400 tons per day by June. However, output from the plant was severely curtailed during the last half of the year owing to power shortages. The plant's phase-one circuit, which was rated at 300 tons per day capacity, was also scheduled for rehabilitation, but remained inoperative throughout the year. Extensive drilling and analysis of remaining limestone reserves near the Tororo cement complex, in eastern Uganda, showed the quality is borderline for continuance of the manufacture of cement at that plant. The Turkish Cement Corp., which is under contract to the Ugandan Government to evaluate and rehabilitate the facilities, was to make a decision and recommendation to the Government early in 1983. Production of cement from the Tororo plant in 1982 was minimal. Output of asbestos products from the complex faired better, and the plant was reported to have operated at 30% of capacity during the year.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Burundi francs (FBu) to U.S. dollars at a rate of FBu 90.0=US$1.00.

[3]Where necessary, values have been converted from Ethiopian birr (B) to U.S. dollars at the rate of B2.07=US $1.00.

[4]Where necessary, values have been converted from Reunionese francs (F) to U.S. dollars at the rate of F6.50=US$1.00.

[5]Where necessary, values have been converted from Rwandan francs (RF) to U.S. dollars at the rate of RF92.84=US$1.00

[6]Where necessary, values have been converted from Somali shillings (S Sh) to U.S. dollars at the rate of S Sh15.2=US$1.00.

[7]Where necessary, values have been converted from Swazi emalangeni (E) to U.S. dollars at the rate of E0.08=US$1.00.

[8]Where necessary, values have been converted from Tanzanian shillings (T Sh) to U.S. dollars at the rate of T Sh9.0=US$1.00.

[9]Where necessary, values have been converted from Ugandan shillings (U Sh) to U.S. dollars at the rate of U Sh95.0=US$1.00.

The Mineral Industry of Other West African Countries

By George A. Morgan[1]

CONTENTS

BENIN

Mineral production was confined to output of cement and gravel. However, exploration was being conducted by the U.S.S.R. and the United Nations Development Program. Development of a domestic limestone deposit and crude oil from an offshore oilfield was underway. Benin's currency remained fixed to the French franc. The gross domestic product (GDP) was $977 million in 1981, the latest year for which information was available.[2]

COMMODITY REVIEW

Cement.—Construction of a cement plant with 500,000 tons per year capacity neared completion at Pobé. The operator of the plant, using locally produced limestone, was the Société des Ciments d'Onigbolo, a joint venture between Benin and Nigeria. Nigeria was expected to utilize most of the cement produced. Equipment for the plant included a 1,600-ton-per-day, oil-fired preheater.

Petroleum.—Development of the Seme Oilfield neared completion. Storage facilities and pipelines were completed, and training of Beninese personnel from the Office Beninois des Mines et el'Energie commenced. Five production wells were planned for the field, and total output was expected to reach about 15,000 barrels per day. All production was to be exported because there was no domestic refinery capacity. Benin imported all its liquid fuel requirements and also acted as an entrepôt for inland countries such as Upper Volta and Niger.

Table 1.—Other countries of West Africa: Production of mineral commodities[1]

Country[2] and commodity[3]	1978	1979	1980	1981[p]	1982[e]
BENIN					
Cement, hydraulic[4] metric tons	200,000	r250,000	284,530	297,000	5314,542
Salt, marine[e] do	300	350	400	400	100
Stone: Gravel[e] do	20,000	21,000	22,000	22,000	NA
CAPE VERDE ISLANDS					
Pumice and related volcanic materials[e] metric tons	15,000	r15,000	15,000	10,000	NA
Salt do	16,891	16,196	22,134	6,445	6,500
IVORY COAST					
Cement[e 4] thousand metric tons	1,200	51,300	1,300	1,200	1,100
Diamond:					
Gem[e] thousand carats	--	5	--	--	--
Industrial[e] do	10	32	--	--	--
Total do	10	37	--	--	--
Petroleum and refinery products:[6]					
Crude oil thousand 42-gallon barrels	--	--	e240	2,220	53,278
Refinery products:					
Gasoline do	2,210	e2,200	2,091	1,942	51,896
Kerosine and jet fuel do	1,117	e1,100	1,248	899	5895
Distillate fuel oil do	3,678	e3,600	2,768	3,710	53,536
Residual fuel oil do	4,344	e4,300	4,995	3,996	54,029
Liquefied petroleum gas do	182	e180	93	75	581
Refinery fuel and losses do	521	e500	482	100	5803
Total do	12,052	e11,880	11,677	10,722	511,240
MALI					
Cement, hydraulic metric tons	34,400	26,758	20,000	e20,000	27,000
Gold, mine output, metal content troy ounces	965	e1,100	e1,500	16,000	13,000
Phosphate rock[e] metric tons	2,000	2,000	2,000	5,000	10,000
Salt[e] do	4,500	4,500	4,500	4,500	4,500
Stone:					
Granite square meters	6,000	415	--	--	--
Marble do	400	400	500	e500	NA
Limestone metric tons	495	500	4,600	e4,600	NA
NIGER					
Cement, hydraulic do	e40,000	38,000	41,000	37,000	538,000
Coal do	--	--	--	72,800	75,000
Gypsum do	2,720	2,720	e2,720	e2,720	3,000
Molybdenum concentrate, metal content do	--	100	122	113	542
Phosphate rock do	--	1,000	1,000	6,000	51,000
Salt[e] do	900	900	3,000	3,000	53,000
Stone, sand and gravel:					
Gravel cubic meters	e180,000	180,000	180,000	180,000	NA
Sand do	e6,000	6,000	6,000	6,000	NA
Tin, mine output, metal content metric tons	r71	r98	64	55	541
Uranium concentrate, U_3O_8 content do	r2,693	r4,410	4,869	5,137	55,014
SENEGAL					
Cement, hydraulic do	357,000	380,688	386,234	371,600	5363,470
Clays: Fuller's earth (attapulgite) do	6,930	13,000	3,978	32,973	598,999
Gold troy ounces	e250	--	NA	NA	NA
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	502	1,141	1,057	1,144	5738
Jet fuel and kerosine do	616	1,095	1,101	942	5651
Distillate fuel oil do	2,248	1,319	1,178	996	5825
Residual fuel oil do	1,883	2,121	1,985	1,593	51,200
Other do	57	102	87	75	540
Refinery fuel and losses do	e256	235	188	186	5147
Total do	e5,562	6,013	5,596	4,936	53,601
Phosphate rock and related products:					
Crude:					
Aluminum phosphate thousand metric tons	204	184	224	199	5279
Calcium phosphate do	1,555	1,651	1,408	1,500	5902
Manufactured:					
Aluminum phosphate, dehydrated do	48	78	132	106	5136
Other[7] do	6	10	8	5	55
Salt[e] metric tons	140,000	140,000	140,000	140,000	160,000
Stone:					
Basalt cubic meters	100,000	NA	NA	NA	NA
Marble (cipoline) do	e150	NA	NA	NA	NA

See footnotes at end of table.

Table 1.—Other countries of West Africa: Production of mineral commodities[1] —Continued

Country[2] and commodity[3]	1978	1979	1980	1981[p]	1982[e]
TOGO					
Cement products:					
Clinker ____ thousand metric tons	--	[e]70	468	602	868
Cement[8] ____ do	[4]528	295	303	285	279
Iron and steel:					
Crude[e] ____ do	--	3	5	5	5
Semimanufactures[e] ____ do	--	10	10	10	10
Petroleum refinery products:					
Gasoline ____ thousand 42-gallon barrels	[e]435	673	544	([9])	
Kerosine and jet fuel ____ do	[e]280	432	347	([9])	
Distillate fuel oil ____ do	915	1,417	621	([9])	NA
Residual fuel oil ____ do	[e]290	440	725	([9])	
Minor products, refinery fuel and losses ____ do	[e]130	[e]200	99	([9])	
Total ____ do	[e]2,050	3,162	2,336	([9])	NA
Phosphate rock, beneficiated product ____ thousand metric tons	2,827	2,920	2,933	2,215	[5]2,800
Salt[e] ____ metric tons	650	650	600	600	600
Stone: Marble, dimension ____ square meters	23	NA	NA	NA	[5]15,087
UPPER VOLTA					
Phosphate rock[e] ____ thousand metric tons	--	--	3	3	3

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through Aug. 22, 1983.

[2]In addition to the countries listed, The Gambia, Guinea-Bissau, and Upper Volta, which are covered in the text of this chapter, presumably produce a variety of crude construction materials (clays, stone, and sand and gravel) and may produce gypsum, lime, and salt, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[3]In addition to the commodities listed, a variety of crude construction materials (clays, stone, and sand and gravel) presumably is produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[4]Output based entirely on imported clinker.

[5]Reported figure.

[6]Data are for years ending Sept. 30 of that stated.

[7]Products marketed under the trade names "Balifos," "Phospal," and "P 125."

[8]One-third of domestically produced clinker from limestone mined at Tabligbo, Togo, is used domestically for cement production. Ghana and the Ivory Coast each receive one-half of the remaining clinker output. Togo also imports clinker for the production of cement by Ciment du Togo.

[9]Revised to zero.

CAPE VERDE ISLANDS

Output of mineral-related products in 1982 was confined to crude construction materials and salt. Data available on salt indicated that about one-half of the quantity produced yearly was exported. Project study of a proposed cement plant on the Island of Maio continued. If approved, actual first-phase output of 60,000 tons per year of cement would not commence before 1987. Locally produced limestone and pozzolana would be used for feed material.

THE GAMBIA

Excluding output of unknown quantities of crude construction materials, mineral industry activity in The Gambia was insignificant in 1982. Petroleum refinery product requirements were met through imports.

GUINEA-BISSAU

Mineral industry activity was confined to exploitation of unknown quantities of crude construction materials. Detailed trade data was unavailable, but the major portion of both quantity and value of all trade was with Europe, particularly Portugal.

Installation of two of the seven planned generators at Bafata was completed by the U.S.S.R. Electricity from the generators will be used to supply the eastern towns of Gabu, Contuboel, Bamba-Dinca, and Xime.

The U.S.S.R. also continued a feasibility study for the exploitation of bauxite deposits near Boe. Preliminary plans were underway regarding the terms of their development should exploitation prove economical.

IVORY COAST

The only nonfuel mineral product produced in 1982 was cement from imported clinker. A new offshore oilfield came into production and a new petroleum refinery provided local production of refined products, with excess output exported.

Exploration continued, particularly in the west and northwest where uranium and gold have been discovered. The advances made in energy self-sufficiency, both from petroleum and hydroelectric power, were counterbalanced by low prices and a general recession in the agricultural and industrial sectors. The GDP was $7.7 billion in 1982.[3]

The Ministry of Mines was responsible for activities in the mining industry and had 150 professionals, many educated in the United States. Majority ownership by the Government of an enterprise was not required and could be held by a private investor. In addition, exemption from taxes for the first 5 years was possible.

COMMODITY REVIEW

Cement.—Production was reported from three plants using imported clinker; two were located in Abidjan and one in San Pedro. France and Spain were the principal sources for clinker. However, one-third of the clinker produced in Togo from the Tabligbo plant was also imported based on the terms of an agreement reached in 1977 with Togo and Ghana for participation in a regional clinker plant.

Copper-Nickel.—Société pour le Development Minière de la Côte d'Ivoire conducted a drilling program at Samapleu-Obangbapleu that resulted in discovery of a basic-ultra basic igneous complex. Chalcopyrite, pentlandite, and pyrrhotite were found as both massive and disseminated mineralization.

Gold.—Development of the Ity gold deposit remained under study. Mine life was estimated at 13 years at an annual production of 160,000 tons of ore grading 0.27 troy ounce per ton. An initial investment of about $18 million was estimated to be required for development.

Petroleum.—Oil production commenced from the Espoir Field in August 1982 from five wells drilled by Phillips Petroleum Co. Sand problems adversely affected output from the field, which yielded about 18,000 barrels per day of crude oil. Three additional wells may be drilled. Excluding gas used for platform fuel, all associated gas produced was flared, which amounted to over 8 million cubic feet per day. Crude oil was moved from a production gathering platform through a 2-mile-long pipeline to a permanently moored 229,240-deadweight-ton, very large, combination carrier. The carrier served as a storage and loading system for shuttle tankers.

The final stage of a second development phase costing $48 million was being completed on the Belier Field, which commenced production in August 1980. Water injection and gas lift methods were being implemented to maintain pressure.

The hydrocracking unit at a new refinery in Abidjan was to commence operation in early 1983. The refinery had a capacity of 40,000 barrels per day. Parts for the new plant were salvaged from the old refinery. Unused capacity beyond domestic requirements may be contracted to refine petroleum for Upper Volta and Mali.

Uranium.—Exploration took place in the region of Odienne where some 50 anomalies were detected by radiometric survey. Anomalies at Gbahalan and Bougoussa were determined to be uraniferous, and those at Bouendiedoufou, Tiemba, and Farakro were determined to be thorium related. Detailed exploration was also completed at several other localities having uranium mineralization.

Table 2.—Ivory Coast: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	29	1	NA	NA.
Aluminum: Metal including alloys: Unwrought value, thousands	(2)	$1	NA	NA.
Semimanufactures	1,624	1,384	NA	Niger 648; Upper Volta 286; Gabon 178.
Beryllium: Metal including alloys, all forms	--	2	NA	NA.
Copper: Metal including alloys: Scrap	1,023	1,295	NA	Belgium-Luxembourg 519; Hungary 156; India 155.
Semimanufactures	38	1	NA	NA.
Iron and steel: Metal: Scrap	21,714	18,434	NA	Yugoslavia 14,449; Spain 3,800.
Steel, primary forms	--	8	NA	NA.
Semimanufactures: Bars, rods, angles, shapes, sections	491	532	NA	Niger 213; Upper Volta 90.
Universals, plates, sheets	1,195	1,205	NA	Niger 706; Mali 121; Upper Volta 92.
Hoop and strip	1	3	NA	NA.
Rails and accessories	73	4,815	NA	Upper Volta 4,799.
Wire	223	111	NA	NA.
Tubes, pipes, fittings	511	1,868	NA	Nigeria 664; Ghana 290; Upper Volta 230.
Castings and forgings, rough	3	9	NA	Nigeria 7.
Lead: Oxides	3	--		
Metal including alloys: Scrap	776	844	NA	France 322; United Kingdom 147; Spain 41.
Unwrought	375	649	NA	Republic of South Africa 449; Malaysia 150.
Manganese: Ore and concentrate	--	1	NA	NA.
Metalloids: Unspecified	101	1	NA	NA.
Nickel: Matte and speiss	--	32	NA	NA.
Metal including alloys: Scrap	22	41	NA	NA.
Semimanufactures	1	9	NA	NA.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	--	$4	NA	NA.
Tin: Metal including alloys: Scrap	10	--		
Unwrought	--	8	NA	NA.
Semimanufactures	--	1	--	All to Guinea.
Titanium: Oxides	1	24	NA	NA.
Zinc: Metal including alloys: Scrap	966	766	NA	France 400; Spain 116; Netherlands 114.
Semimanufactures	1	--		
Other: Ores and concentrates	--	1	NA	NA.
Ashes and residues	(2)	--		
NONMETALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	--	15	NA	NA.
Grinding and polishing wheels and stones value, thousands	$23	--		
Barite and witherite	1,628	--		
Cement	25,344	188,007	NA	Mali 102,132; Upper Volta 77,819; Guinea 7,426.
Chalk	2	11	NA	NA.
Clays and clay products: Crude, unspecified	168	105	NA	Niger 99.
Products: Nonrefractory	57	93	NA	Niger 33.
Refractory including nonclay brick	18	34	NA	NA.
Diamond: Industrial value, thousands	$38	--		
Fertilizer materials: Crude, n.e.s	416	--		
Manufactured: Ammonia	36	528	NA	France 498.
Unspecified and mixed	541	453	NA	Mali 430.
Gypsum and plaster	34	118	NA	NA.
Lime	235	65	NA	NA.

See footnotes at end of table.

Table 2.—Ivory Coast: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Magnesium compounds: Magnesite value, thousands	$5	--		
Pigments, mineral: Iron oxides and hydroxides, processed	1	(2)	NA	NA.
Precious and semiprecious stones other than diamond: Synthetic value, thousands	--	$3	NA	NA.
Salt and brine	1,013	2	NA	NA.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	9	(2)	NA	NA.
Sodium carbonate, natural and manufactured	29	44	NA	NA.
Sodium hydroxide	49	23	NA	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	231	2	NA	NA.
Worked	3	--		
Sand other than metal-bearing	--	1	NA	NA.
Sulfur:				
Elemental, crude including native and byproduct	40	(2)	NA	NA.
Sulfuric acid	85	64	NA	NA.
Talc, steatite, soapstone, pyrophyllite	1	1	NA	NA.
Other:				
Crude	28	23	NA	NA.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	16	22	NA	NA.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	13	--		
Carbon: Carbon black	9	2	NA	NA.
Petroleum and refinery products:				
Crude—42-gallon barrels	--	7	NA	NA.
Refinery products:				
Liquefied petroleum gas—do	15,741	8,271	NA	Upper Volta 5,417; Mali 2,042.
Gasoline—do	781,686	729,589	824	Mali 379,015; Upper Volta 343,850.
Mineral jelly and wax thousand 42-gallon barrels	220	--		
Kerosine and jet fuel 42-gallon barrels	237,034	178,498	NA	Mali 97,247; Upper Volta 78,709.
Distillate fuel oil—do	841,466	935,178	67,625	Spain 185,448; Mali 161,218; France 157,540.
Lubricants—do	138,215	138,068	504	Ghana 26,516; France 22,253; Upper Volta 15,848.
Residual fuel oil thousand 42-gallon barrels	1,457	1,942	34	France 409; Upper Volta 249; Netherlands 203.
Bitumen and other residues 42-gallon barrels	3,309	428,224	NA	Nigeria 359,891; Cameroon 67,811.
Bituminous mixtures—do	18,259	78,907	NA	Nigeria 75,296; Niger 1,103.
Tars and other crude chemicals derived from coal, gas, and petroleum	7	5	NA	NA.

NA Not available.
[1]Data for 1980 were not available at the time of publication.
[2]Less than 1/2 unit.

Table 3.—Ivory Coast: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified	2	1	NA	NA.
Aluminum:				
Ore and concentrate value, thousands	--	$2	NA	NA.
Oxides and hydroxides	(2)	42	NA	France 41.
Metal including alloys:				
Scrap	57	68	NA	NA.
Unwrought	20	1	NA	NA.
Semimanufactures	7,504	5,624	11	Cameroon 4,005; France 729; Italy 417.
Chromium: Oxides and hydroxides	15	10	NA	NA.
Copper:				
Matte and speiss including cement copper	2	9	NA	NA.
Metal including alloys:				
Scrap	--	1	NA	NA.
Unwrought	--	24	--	Mainly from France.
Semimanufactures	1,659	1,040	--	France 620; Belgium-Luxembourg 276; Brazil 97.
Iron and steel: Metal:				
Scrap	(2)	363	NA	NA.
Pig iron, cast iron, related materials	24	33	NA	NA.
Ferroalloys, unspecified	28	29	NA	France 19.
Steel, primary forms	9,446	4,489	--	France 2,493; Belgium-Luxembourg 999; Spain 996.
Semimanufactures:				
Bars, rods, angles, shapes, sections	54,244	39,200	NA	France 23,242; Spain 9,033; Italy 2,081.
Universals, plates, sheets	70,298	59,553	NA	France 37,322; Japan 13,658; Belgium-Luxembourg 5,205.
Hoop and strip	1,842	2,256	72	France 915; West Germany 846; United Kingdom 149.
Rails and accessories	1,928	5,370	--	Canada 4,799; France 556.
Wire	2,683	1,892	NA	France 1,498; Belgium-Luxembourg 194; Senegal 136.
Tubes, pipes, fittings	16,433	19,561	1,213	West Germany 5,734; Japan 4,775; France 4,564.
Casting and forgings, rough	2,017	444	NA	France 243; Belgium-Luxembourg 127.
Lead:				
Ore and concentrate value, thousands	--	$1	NA	NA.
Oxides	146	43	NA	France 39.
Metal including alloys:				
Scrap	--	49	NA	NA.
Unwrought	207	73	--	All from France.
Semimanufactures	119	41	NA	France 14.
Magnesium: Metal including alloys, all forms	(2)	--		
Manganese:				
Ore and concentrate	1,103	900	--	All from Gabon.
Oxides	1,353	1,384	--	France 743; Belgium-Luxembourg 500; Ireland 140.
Mercury value, thousands	$7	$8	NA	NA.
Metalloids: Unspecified	14	11	NA	NA.
Molybdenum: Metal including alloys, all forms	--	3	NA	NA.
Nickel: Metal including alloys, semimanufactures	299	508	13	France 250; Italy 144; Belgium-Luxembourg 50.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$7	$1	NA	NA.
Silver:				
Waste and sweepings kilograms	--	202	NA	NA.
Metal including alloys, unwrought and partly wrought value, thousands	$1,057	$147	NA	France $89.
Tin: Metal including alloys:				
Unwrought	2	3	--	All from France.
Semimanufactures	27	8	NA	France 7.
Titanium: Oxides	427	392	NA	United Kingdom 270; France 43; Spain 25.
Tungsten: Metal including alloys, all forms value, thousands	$1	$1	NA	NA.
Uranium and/or thorium: Ore and concentrate do	$1	--		

See footnotes at end of table.

Table 3.—Ivory Coast: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Oxides	37	40	NA	France 38.
Metal including alloys:				
Scrap	18	107	NA	NA.
Unwrought	5,188	5,137	--	Belgium-Luxembourg 2,343; France 2,100; Canada 599.
Semimanufactures	88	--		
Other:				
Ores and concentrates	27,293	3	NA	NA.
Base metals including alloys, all forms	5	8	NA	France 4.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	79	20,995	NA	Togo 20,992.
Artificial: Corundum	41	47	NA	NA.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$1	$1	NA	NA.
Grinding and polishing wheels and stones	93	129	NA	France 35; Italy 30; West Germany 15.
Asbestos, crude	7	18	NA	NA.
Barite and witherite	345	19,273	335	Spain 11,508; Morocco 3,599; Ireland 2,250.
Boron materials:				
Crude natural borates	302	381	379	NA.
Oxides and acids	3	(2)	NA	NA.
Cement thousand tons	1,018	972	--	France 482; Spain 179; Togo 148.
Chalk	3,036	3,865	NA	France 3,476; Spain 335.
Clays and clay products:				
Crude, unspecified	882	3,128	790	United Kingdom 733; Norway 642; France 436.
Products:				
Nonrefractory	13,238	7,360	NA	France 2,406; Italy 1,701; West Germany 1,508.
Refractory including nonclay brick	860	610	NA	France 492.
Diatomite and other infusorial earth	238	258	NA	France 177.
Feldspar, fluorspar, related materials:				
Unspecified	10	46	NA	NA.
Fertilizer materials:				
Crude, n.e.s	--	2	NA	NA.
Manufactured:				
Ammonia	4,969	2,938	NA	United Kingdom 1,848; France 988.
Nitrogenous	21,758	16,208	NA	France 16,052; Netherlands 149.
Phosphatic	1,750	3,065	--	Senegal 1,871; France 895; Belgium-Luxembourg 298.
Potassic	42,487	43,669	NA	Spain 28,235; Belgium-Luxembourg 8,150; East Germany 7,000.
Unspecified and mixed	23,385	15,213	10,195	Netherlands 5,004.
Graphite, natural	--	1	NA	NA.
Gypsum and plaster	53,547	45,237	NA	Spain 20,506; Morocco 20,148; France 4,512.
Halogens:				
Chlorine	110	91	--	All from France.
Unspecified	2	2	NA	NA.
Lime	7,471	7,467	NA	France 3,942; Belgium-Luxembourg 2,249; Israel 1,222.
Magnesium compounds: Magnesite	13	3	NA	NA.
Mica:				
Crude including splittings and waste	5	18	NA	NA.
Worked including agglomerated splittings value, thousands	--	$4	NA	NA.
Phosphates, crude	6,207	6,308	--	Senegal 5,300; Togo 800; France 208.
Pigments, mineral: Iron oxides and hydroxides, processed	15,189	49	NA	West Germany 37.
Precious and semiprecious stones other than diamond: Natural value, thousands	$13	$28	NA	NA.
Salt and brine	43,850	46,159	NA	Senegal 42,356; France 2,886.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	110	18	NA	NA.
Sodium carbonate, natural and manufactured	1,521	2,267	NA	France 1,179; East Germany 355; Belgium-Luxembourg 199.

See footnotes at end of table.

Table 3.—Ivory Coast: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s. —Continued				
Sodium hydroxide	9,654	11,145	NA	France 5,128; East Germany 1,776; West Germany 949.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,342	1,189	NA	Italy 559; Brazil 255.
Worked	2,246	2,817	NA	Italy 2,450; China 168.
Dolomite, chiefly refractory-grade	4,768	5,561	NA	France 4,083; Upper Volta 1,326.
Gravel and crushed rock	3,244	626	NA	Italy 565.
Limestone other than dimension	--	1,273	NA	NA.
Quartz and quartzite	162	8	NA	NA.
Sand other than metal-bearing	145	968	784	NA.
Sulfur:				
Elemental:				
Crude including native and byproduct	7,797	7,797	NA	France 7,756.
Colloidal, precipitated, sublimed	6	5	NA	NA.
Sulfuric acid	4	3,358	NA	United Kingdom 3,353.
Talc, steatite, soapstone, pyrophyllite	917	1,375	NA	France 1,231.
Other:				
Crude	6,890	2,877	NA	West Germany 2,838.
Slag and dross, not metal-bearing	39,796	69,560	--	All from France.
Oxides and hydroxides of barium, magnesium, strontium	5	2,062	NA	Morocco 2,000.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	2,577	2,692	--	France 2,424; Canada 12.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	300	336	--	All from France.
Carbon: Carbon black	258	299	NA	France 74.
Coal: All grades excluding briquets	--	23	NA	NA.
Coke and semicoke	80	129	NA	NA.
Peat including briquets and litter	34	76	NA	NA.
Petroleum and refinery products:				
Crude— thousand 42-gallon barrels	10,418	10,959	NA	Venezuela 5,440; Nigeria 2,090; Saudi Arabia 1,015.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	35,241	109,469	NA	France 52,664; Nigeria 34,881; United Kingdom 8,561.
Gasoline —do—	686,894	867,638	1,853	Brazil 708,747; Netherlands 63,308; Greece 44,965.
Mineral jelly and wax —do—	9,822	9,200	NA	West Germany 7,107; Netherlands 999; France 897.
Kerosine and jet fuel —do—	105,640	208,180	4,836	Brazil 144,677; Greece 19,398; United Kingdom 13,810.
Distillate fuel oil —do—	433,978	440,326	--	Brazil 412,710; Netherlands 14,308; Canada 7,132.
Lubricants —do—	363,678	275,968	58,702	Trinidad and Tobago 124,971; France 48,496; Netherlands 32,382.
Residual fuel oil —do—	95,997	6,713	NA	Brazil 5,328; France 713.
Bitumen and other residues do—	8,690	5,830	NA	Belgium-Luxembourg 2,657; France 1,905; Austria 793.
Bituminous mixtures —do—	2,036	2,660	667	France 976; Belgium-Luxembourg 418.
Tars and other crude chemicals derived from coal, gas, and petroleum	2,122	1,396	NA	Netherlands 1,311.

NA Not available.
[1]Data for 1980 were not available at the time of publication.
[2]Less than 1/2 unit.

MALI

Although small, the mineral industry of Mali improved in terms of the quantity of mineral-related products produced. Extensive activity continued in the areas of mineral exploration and expansion of existing production facilities. A wide range of mineral-related materials were the objects of investigation, including gold, diamonds, phosphate, iron ore, steel, uranium, and oil.

The index of industrial production (1969=100) increased to 540.5 in 1981 from 388.9 in 1980. The Government began to open state corporations to private investors, including foreign partners. The investment code was considered favorable owing to a liberal repatriation system. Executive Order 76-81 offered tax-free privileges for 5 to 10 years for special sectors, such as metallurgical industries, energy, and construction. Manufacturing concerns must offer the Government 10% to 15% ownership. A further liberalization of the investment code was expected in 1983.

Data on economic activity for Mali were generally dated and limited. The gross national product was $1,200 million in 1981, the latest year available.[4] The trade deficit in 1981 was $199 million. France was the principal trading partner in terms of both exports and imports.

COMMODITY REVIEW

The Bureau de Recherches Géologiques et Minières (BRGM) followed up on agreements made for exploration and development in various areas. The potential for gold, copper, tin, and diamond production from the Kenieba region was researched by the Syndicat Franco-Maliende Recherches Minières, composed of Mali, BRGM, and the Société Moderne des Produits Metallurgiques, an affiliate of Compagnie Générale des Matières Nucléaires (COGEMA) of France. Diamond-bearing kimberlites were located in the vicinity of Kenieba prior to 1967 by Selection Trust, but were considered not commercially exploitable. The Power Reactor and Nuclear Fuel Development Corp. of Japan was to spend $2.7 million during the 1982-83 fiscal year for exploration in the vicinity of In Tamat, Gourma, and Chag Gueret. COGEMA also had several permits for uranium exploration in the areas of Kenieba, Taoudeni, and Hambori-Douentza.

Energy.—All hydrocarbon products consumed were imported, as there was no refinery or crude oil production. The total value of imported petroleum products was estimated at $91 million in 1982. The main products were gasoline, diesel fuel, and aviation fuel.

The total thermal electric generating capacity was 40.1 megawatts in 1978, the latest year available. Bamako accounted for 31.9 megawatts. Hydroelectric energy was from three sources: Sotuba, 5.4 megawatts; Felou, 0.5 megawatt; and Selingue, 44.0 megawatts. Construction continued on a dam and power station at Manatali to supply 200 megawatts.

Gold.—The Kalana Mine, operated by the U.S.S.R. in conjunction with the Société Nationale de Recherches Minières, (SONAREM) continued to expand output, although at low levels owing to technical problems. At full capacity, SONAREM's annual production was to be about 57,000 troy ounces of gold and 15,000 troy ounces of silver.

Iron and Steel.—The Krupp Group of the Federal Republic of Germany signed an agreement with the Government for the creation of the Société Malienne de Siderurgie (SOMASID). SOMASID was to promote development of a 30,000-ton-per-year steel production facility, using iron ore from the unexploited Bale deposit. Two small pig iron plants were operated by Entreprise Malienne de Fonderie. Consumption was about 450 tons per year of scrap, and castings produced were used locally.

Phosphate Rock.—Phosphate output from the Tilemsi Valley deposit was small and consumed locally for agricultural use. A crushing plant, representing the areas first industrial investment, commenced at Bourem. It was funded by the Federal Republic of Germany.

NIGER

The Niger mining sector was in general decline in 1982, mainly as a result of lower world demand for uranium, the country's principal foreign exchange earner. Output of uranium fell slightly, and low demand resulted in delays in further development by various consortiums.

Since Government budget expenditures were heavily dependent upon the profitability of the uranium sector, the economy was

in general recession. The GDP was $1,997 million, the second consecutive year of decline from the 1980 high of $2,345 million.[5] Imports exceeded exports by $157 million. Uranium exports, in terms of elemental uranium, were 3,780 tons compared with 4,857 tons in 1981.

COMMODITY REVIEW

Cement.—The Société Nigérienne de Cimenterie operated the country's only cement plant at Malbaza with a capacity of 40,000 tons per year. The company was expected to start up a new 300,000-ton-per-year plant at Malbaza in 1983.

Iron Ore.—KHD Humboldt AG of the Federal Republic of Germany was to evaluate iron ore located at Say, 30 kilometers southeast of Niamey. Reserves were estimated at 650 million tons. A beneficiation procedure was to be developed both for concentrating the ore and for reducing its high phosphorus content to acceptable levels. Pelletizing and direct-reduction potential of the ore was to be evaluated also.

Petroleum.—Société National Elf Aquitaine of France reported the discovery of a small deposit of oil in the extreme eastern part of Niger between Agadem and the border of Chad. Two of three wells drilled gave positive results, and the economic potential of the deposit was being evaluated.

Salt.—Production was from Tidekelt and has amounted to several thousand tons per year. A capacity increase to 8,000 tons per year was planned for 1983.

Uranium.—Output was expected to decline owing to low world demand. Production levels were to match purchase commitments. A reported surplus of 1,000 tons of uranate was nearly eliminated by the purchase of 900 tons by France. The price of uranium was raised to about $31 per pound of uranate, an increase of about $4.10 per pound.

Development of a new open pit mine at Arni by Société Minière de Tassa N'Taghalgue (SMTT) continued. However, owing to anticipated low demand, SMTT planned to mill and process ore at the facility of Société des Mines de l'Aïr, one of two active uranium producers in Niger.

Table 4.—Niger: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Iron and steel: Metal:				
Scrap	8	26	--	Mainly to Ivory Coast.
Semimanufactures:				
Bars, rods, angles, shapes, sections	7	30	--	All to Mali.
Universals, plates, sheets	--	1	--	Do.
Tubes, pipes, fittings	(2)	158	12	Mali 102; France 30; Nigeria 13.
Castings and forgings, rough value, thousands	--	$1	--	All to Mali.
Manganese: Ore and concentrate thousand tons	(2)	2,152	--	Japan 790; France 649; Libya 349.
Metalloids: Unspecified value, thousands	$1	$1	--	All to Mali.
Molybdenum: Metal including alloys, all forms	--	167	--	France 69; Spain 16.
Tin: Ore and concentrate	--	225	--	Nigeria 189; Belgium-Luxembourg 18; France 18.
Uranium and/or thorium: Ore and concentrate value, thousands	$391,426	NA		
Other: Ores and concentrates	NA	253,593	--	France 151,737; Libya 54,913; Japan 23,528.
NONMETALS				
Cement	--	94	--	All to Mali.
Clays and clay products:				
Crude, unspecified	4	--		
Products:				
Nonrefractory	--	9	--	All to Nigeria.
Refractory including nonclay brick	33	15	--	All to Mali.
Diatomite and other infusorial earth	47	--		
Fertilizer materials: Manufactured:				
Nitrogenous	755	--		
Unspecified and mixed	299	--		
Graphite, natural	--	58	--	Nigeria 34; Upper Volta 24.

See footnotes at end of table.

Table 4.—Niger: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Salt and brine	460	2,112	--	Nigeria 1,943; Upper Volta 135; Ghana 32.
Other:				
Crude	163	--		
Slag and dross, not metal-bearing	--	22	--	All to France.
Oxides and hydroxides of barium, magnesium, strontium	--	18	--	Mali 14; France 4.
MINERAL FUELS AND RELATED MATERIALS				
Coal: Briquets of anthracite and bituminous coal	--	23	--	All to Spain.
Petroleum and refinery products:				
Crude—42-gallon barrels	15	--		
Refinery products:				
Gasoline—do	459	212	NA	NA.
Kerosine and jet fuel—do	10,749	44,408	NA	Mali 364.
Distillate fuel oil—do	373	1,112	--	All to Mali.
Lubricants—do	--	280	--	Do.
Residual fuel oil—do	646	--		
Bitumen and other residues—do	12	--		

NA Not available.
[1]Data for 1980 were not available at time of publication.
[2]Less than 1/2 unit.

Table 5.—Niger: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Unspecified—value, thousands	$16	$1	--	All from France.
Aluminum:				
Oxides and hydroxides—do	--	$2	--	Do.
Metal including alloys:				
Scrap—do	--	$1	--	All from Nigeria.
Unwrought	--	1	--	All from France.
Semimanufactures	954	780	--	Cameroon 550; Nigeria 117; France 74.
Copper:				
Matte and speiss including cement copper—value, thousands	--	$1	NA	NA.
Metal including alloys:				
Unwrought	--	1	--	Mainly from West Germany.
Semimanufactures	21	28	(2)	France 23; West Germany 3; Yugoslavia 1.
Iron and steel: Metal:				
Scrap	278	141	--	Nigeria 132; France 9.
Pig iron, cast iron, related materials	12	4	(2)	Mainly from France.
Steel, primary forms	12	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections	9,387	8,204	--	France 3,255; Nigeria 2,598; Togo 692.
Universals, plates, sheets	2,287	2,445	--	France 997; Ivory Coast 681; Nigeria 527.
Hoop and strip	60	70	--	Nigeria 47; France 23.
Rails and accessories	6	5	--	All from France.
Wire	377	155	4	Nigeria 43; France 41; Senegal 41.
Tubes, pipes, fittings	2,637	2,056	19	France 829; Ivory Coast 619; Nigeria 335.
Castings and forgings, rough	198	134	(2)	France 125; West Germany 8.
Lead:				
Oxides	3	--		

See footnotes at end of table.

Table 5.—Niger: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys:				
Scrap	--	1	--	Mainly from France.
Semimanufactures	1	5	--	France 3.
Manganese:				
Ore and concentrate	501	--		
Oxides	43	80	--	All from France.
Mercury 76-pound flasks	--	29	--	All from Nigeria.
Metalloids: Unspecified	2	25	(2)	West Germany 19; East Germany 5; France 1.
Nickel: Metal including alloys, semimanufactures	6	48	--	France 47.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1	--		
Silver: Metal including alloys, unwrought and partly wrought do	$11	$5	--	France $4.
Tin: Metal including alloys:				
Scrap do	$1	--		
Semimanufactures	1	1	--	NA.
Titanium: Oxides	33	21	--	Nigeria 11; France 8; Spain 2.
Uranium and/or thorium: Metal including alloys, all forms value, thousands	--	$1	$1	
Zinc:				
Oxides	--	4	--	Mainly from Nigeria.
Metal including alloys:				
Unwrought	196	--		
Semimanufactures	(2)	148	--	All from France.
Other:				
Ashes and residues	1	--		
Base metals including alloys, all forms	4	6	--	Nigeria 5.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	(2)	5	--	France 4.
Artificial: Corundum	1	--		
Grinding and polishing wheels and stones	11	17	(2)	France 14; Italy 1; West Germany 1.
Barite and witherite	399	2	--	All from France.
Boron materials: Oxides and acids value, thousands	--	$1	--	All from West Germany.
Cement	63,748	93,643	--	Nigeria 75,728; Togo 11,680; Spain 1,673.
Chalk	22	92	--	All from France.
Clays and clay products:				
Crude, unspecified	799	462	99	France 355; Italy 8.
Products:				
Nonrefractory	1,202	1,973	--	France 972; West Germany 542; Italy 151.
Refractory including nonclay brick	78	110	(2)	Nigeria 60; West Germany 28; France 16.
Diamond: Industrial value, thousands	--	$3	--	All from France.
Fertilizer materials: Manufactured:				
Ammonia	15	11	--	Mainly from France.
Nitrogenous	1,391	6,344	--	Nigeria 3,035; France 2,909; Liberia 400.
Phosphatic	2,259	615	96	Nigeria 518.
Potassic	--	472	--	Nigeria 213.
Unspecified and mixed	2,429	5,208	(2)	Nigeria 5,178; France 29.
Gypsum and plaster	133	432	--	France 311; Morocco 99; Togo 18.
Halogens:				
Chlorine value, thousands	$2	$2	--	All from France.
Unspecified	1	3	--	Do.
Lime	152	796	--	France 495; Nigeria 273; Belgium-Luxembourg 28.
Magnesium compounds: Magnesite	35	354	--	United Kingdom 353.
Mica:				
Crude including splittings and waste	5	1	--	All from France.
Worked including agglomerated splittings value, thousands	--	$1	--	All from Nigeria.
Phosphates, crude	--	2	--	All from France.
Pigments, mineral: Iron oxides and hydroxides, processed	4	3	--	France 2; West Germany 1.

See footnotes at end of table.

Table 5.—Niger: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1979[1]	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$1	$1	--	All from Nigeria.
Pyrite, unroasted	24	188	--	All from France.
Salt and brine	28,774	14,718	--	Senegal 11,502; Algeria 1,905; Ghana 882.
Sodium and potassium compounds, n.e.s.: Potassium hydroxide including sodic and potassic peroxides	17	853	--	All from France.
Sodium carbonate, natural and manufactured	5,296	11,244	--	France 10,068; West Germany 1,100; Belgium-Luxembourg 47.
Sodium hydroxide	1,789	2,409	--	France 2,315; Belgium-Luxembourg 49; Netherlands 45.
Stone, sand and gravel: Dimension stone: Crude and partly worked	14	297	--	Italy 124; Nigeria 92; Togo 81.
Worked	(2)	125	--	France 74; Italy 33; Togo 14.
Gravel and crushed rock	4	14	--	All from France.
Sand other than metal-bearing	(2)	1	--	Do.
Sulfur: Elemental, crude including native and byproduct	117,554	34,412	--	France 32,955; West Germany 1,385; Nigeria 51.
Sulfuric acid	55	56	(2)	France 41; Canada 13; West Germany 2.
Talc, steatite, soapstone, pyrophyllite	38	27	--	All from France.
Other: Crude	113	259	--	Nigeria 136; Togo 105; France 17.
Slag and dross, not metal-bearing	--	4	--	All from Nigeria.
Oxides and hydroxides of barium, magnesium, strontium	1,378	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	11	278	--	France 274; Ivory Coast 4.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	--	300	--	Mainly from France.
Coal: Briquets of anthracite and bituminous coal	5	38	--	France 37.
All grades excluding briquets	2	5	--	Mainly from Nigeria.
Peat including briquets and litter	--	9	--	All from Nigeria.
Petroleum refinery products: Liquefied petroleum gas 42-gallon barrels	3,480	766	--	France 673; Nigeria 93.
Gasoline do	549,763	337,009	--	Nigeria 139,884; Algeria 104,261; Italy 23,706.
Mineral jelly and wax do	685	87	--	Nigeria 71; Netherlands 16.
Kerosine and jet fuel do	67,727	65,503	--	Nigeria 20,444; Algeria 18,274; France 6,006.
Distillate fuel oil thousand 42-gallon barrels	1,014	518	--	Nigeria 319; U.S.S.R. 99; Algeria 60.
Lubricants 42-gallon barrels	45,031	26,943	119	France 12,054; Ivory Coast 1,088; Senegal 1,750.
Residual fuel oil do	65,941	82,511	--	Nigeria 51,981; U.S.S.R. 15,818; Algeria 7,193.
Bitumen and other residues do	33,391	18,016	--	Nigeria 15,483; Ivory Coast 1,491; France 497.
Tars and other crude chemicals derived from coal, gas, and petroleum	4	7	--	France 4; Netherlands 3.

NA Not available.
[1]Data for 1980 were not available at time of publication.
[2]Less than 1/2 unit.

SENEGAL

Nonfuel mineral output increased in 1982, with the exception of calcium phosphate, the mining sector's principal commodity. Exploration and development work continued for several additional minerals, including gold, marble, peat, and uranium.

COMMODITY REVIEW

Clays.—Output of attapulgite was by the Société Sénégalaise des Phosphates de Thies (SSPT), both as a byproduct of phosphate rock production and as a primary product. The Compagnie des Produits Chimiques et Materiaux (Prochimat) also produced attapulgite. Output was about 100,000 tons per year and plans were underway to double capacity.

Gold.—An occurrence of gold at Salbadala in Eastern Senegal was explored by BRGM. Approximately 2 million tons of ore grading 0.184 troy ounce per ton was under evaluation for exploitation.

Iron Ore.—Activity remained intense on development of iron ore resources at Falémé in the extreme southeast of Senegal. Lack of infrastructure and low world demand for iron ore remained as impediments to exploitation. Initial investment, including port and rail facilities at Bargy, was estimated at $877 million.[e] Output was planned to start at 12 million tons per year. Both hematite and magnetite resources have been delineated at Falémé.

Marble.—Proven reserves of 350,000 tons of high-grade marble have been reported in the Ibel region. An additional 1 million tons was considered as possible reserves.

Peat.—A trial peat mining and processing plant in the region of Niayes, near Mboro, was being financed at a cost of $350,000 by the European Economic Community. A significant peat deposit was discovered recently between Mboro and Loumpoul, and its development may partially replace fuelwood consumption. Included in the technical and economic viability of the project was its possible effect on the potential agricultural usage of the land and the land's reclamation subsequent to mining.

Phosphate Rock.—Overall output declined from 1981 despite the varying performance of the country's two producers. The reduced output was attributed to declines in both world and domestic consumption and the existence of adequate stockpiles.

Compagnie Sénégalaise des Phosphates de Taïba (CSPT), the principal producer, operated an open pit mine at Taïba. About 1,300 people were employed on a single 8-hour shift, 5 days per week. The normal workweek was 7 days. Mine capacity was 1.5 million tons per year, but could easily be doubled; the concentrator was the limiting factor. Concentrate was shipped 90 kilometers to the terminal at Dakar via two double ore trains. Sales were 100,000 tons per month, and the stockpile was 800,000 tons. CSPT planned to start a completely new and self-contained operation at Ndolene, 22 kilometers distant, following exhaustion of reserves at Taïba.

SSPT operated two open pit mines, one for calcium phosphate and one for aluminum phosphate. The mines were operated 9 months out of the year and were on care and maintenance for July, August, and September. About 240,000 tons of run-of-mine ore produced 140,000 tons of concentrate, which yielded 100,000 tons of clinker. The P_2O_5 content increased from 28.4% in the ore to 29.5% in the concentrate. Clinker content was 34% P_2O_5. Phosphal, a trade product, was produced from aluminum phosphate. Run-of-mine ore was passed through a jaw crusher, a roll crusher, two screenings, then calcined with No. 2 fuel oil and crushed to a final size of minus 150 micrometers. About 28% of the 34% P_2O_5 in Phosphal was organically active and was sold directly to farmers for local use. Mining of the calcium phosphate horizon by SSPT required loosening of 20 meters of hard laterite overburden through the use of ammonium nitrate. Run-of-mine ore was removed by power shovels and loaded on to 30-ton trucks for the 4-kilometer trip to the plant. Waste rock was then run into the pit behind ore extraction, leveled, and reclaimed with trees and grasses.

Table 6.—Senegal: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	12	(1)	--	All to France.
Semimanufactures	1	26	--	France 12; Gambia 11; West Germany 2.
Copper: Metal including alloys:				
Scrap	797	737	--	France 401; West Germany 141; Belgium-Luxembourg 102.
Unwrought and semimanufactures	--	7	--	Mainly to Mauritania.
Iron and steel:				
Iron ore and concentrate	45	--		
Metal:				
Scrap	9,632	14,291	--	Yugoslavia 7,321; Spain 5,138; Italy 1,748.
Ferroalloys	1	7	--	Gabon 4; Cameroon 3.
Semimanufactures:				
Bars, rods, angles, shapes, sections	78	82	--	Mali 30; Mauritania 19; Guinea-Bissau 18.
Universals, plates, sheets	9	617	--	Yugoslavia 225; France 184; Switzerland 142.
Hoop and strip	--	14	--	All to Mali.
Rails and accessories	--	39	--	Guinea-Bissau 24; Norway 14.
Wire	329	843	--	Mauritania 333; Ivory Coast 200; Mali 100.
Tubes, pipes, fittings	27	70	--	Gambia 32; Guinea-Bissau 10; Mauritania 10.
Castings and forgings, rough	5	28	--	Mauritania 24; Guinea-Bissau 4.
Lead: Metal including alloys:				
Scrap	36	153	--	All to Denmark.
Unwrought and semimanufactures	1	--		
Metalloids	10	30	--	Gambia 15.
Nickel: Metal including alloys:				
Scrap	18	2	--	All to France.
Semimanufactures value, thousands	$2	--		
Silver: Waste and sweepings kilograms	--	50	--	All to France.
Zinc: Metal including alloys, scrap	30	--		
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	NA	2	--	Mainly to Italy.
Cement	3,548	1,899	--	Guinea-Bissau 793; Mauritania 439; Mali 309.
Clays and clay products:				
Crude	5,929	18,936	--	France 9,406; Oman 5,500; U.S.S.R. 4,000.
Products:				
Nonrefractory	27	101	--	Gambia 89; Guinea-Bissau 6.
Refractory including nonclay brick	55	1	--	NA.
Fertilizer materials: Manufactured:				
Ammonia	30	18	--	Gambia 11; Ivory Coast 1; Mauritania 1.
Nitrogenous	815	345	--	Mauritania 316; Mali 25; Guinea-Bissau 4.
Phosphatic	148,130	118,997	--	France 85,850; China 14,047; United Kingdom 10,150.
Potassic	2	--		
Unspecified and mixed	38,611	27,562	--	Mali 27,555; Mauritania 7.
Gypsum and plaster	533	143	--	Ivory Coast 81; Mali 62.
Lime	101	72	--	Mali 40; Mauritania 31.
Phosphates, crude thousand tons	1,443	1,086	--	United Kingdom 322; France 203; Greece 141; Bangladesh 128.
Precious and semiprecious stones other than diamond, natural value, thousands	--	$6	--	All to Brazil.
Salt and brine	125,846	155,706	--	Ivory Coast 42,517; Mali 30,611; Cameroon 27,981; Niger 20,544.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	3	(1)	--	NA.
Sodium carbonate, manufactured	76	1	--	All to Mali.
Sodium hydroxide	79	67	--	Mauritania 65.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	9,464	4,220	--	Gambia 3,470; Guinea-Bissau 750.
Worked	1	2	--	All to Gambia.
Gravel and crushed rock	1,510	786	--	Gambia 785.
Sand other than metal-bearing	167	64	--	Mali 61.

See footnotes at end of table.

Table 6.—Senegal: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental, crude including native and byproduct, value, thousands	--	$1	--	All to Mauritania.
Sulfuric acid	12	47	--	Mauritania 42; Mali 5.
Other:				
Crude	--	19	--	All to France.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	376	1,135	--	Guinea-Bissau 538; Mauritania 441; Gambia 147.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	2	--	All to Mauritania.
Coal: Briquets	r20	--		
Petroleum refinery products:				
Nonbunker:				
Liquefied petroleum gas 42-gallon barrels	2,819	5,487	--	Mauritania 3,642; Guinea 1,044; Gambia 719.
Gasoline, do	277,627	467,866	--	Mauritania 160,234; Guinea 103,921; Mali 26,758.
Mineral jelly and wax, do	8	8	--	All to Ivory Coast.
Kerosine and jet fuel, do	91,404	166,908	--	Mauritania 49,494; Mali 44,059; Guinea-Bissau 21,344.
Distillate fuel oil, do	1,911,312	457,671	--	Mali 93,847; Mauritania 37,516; Guinea 32,503.
Lubricants, do	84,588	41,762	--	Mali 12,964; Mauritania 11,025; Gambia 4,844.
Residual fuel oil, do	121,718	104,415	--	Mali 73,653.
Bitumen and other residues, do	(1)	--		
Bituminous mixtures, do	(1)	12	--	All to Guinea-Bissau.
Bunker:				
Liquefied petroleum gas, do	81	58		
Gasoline, do	2,542	3,111		
Kerosine and jet fuel, do	685,999	767,002		
Distillate fuel oil, do	34,428	3,484		
Lubricants, do	49	69,874		
Residual fuel oil, do	5,814	10,749		

rRevised. NA Not available.
[1]Less than 1/2 unit.

Table 7.—Senegal: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals, value, thousands	$8	$2	$1	France $1.
Aluminum:				
Oxides and hydroxides	577	216	--	All from France.
Metal including alloys:				
Unwrought	39	--		
Semimanufactures	258	577	(1)	Sweden 294; France 126; Cameroon 88.
Chromium: Oxides and hydroxides	--	1	--	All from West Germany.
Copper: Metal including alloys:				
Scrap, value, thousands	--	$1	--	All from France.
Unwrought	15	3	--	Belgium-Luxembourg 2; France 1.
Semimanufactures	71	103	(1)	France 99; Japan 2.
Iron and steel: Metal:				
Scrap, value, thousands	--	$1	--	All from United Kingdom.
Pig iron, ferroalloys, related materials	37	17	--	All from France.
Steel, primary forms	NA	41	(1)	France 30; West Germany 10.

See footnotes at end of table.

Table 7.—Senegal: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	20,872	21,805	--	France 16,128; Mauritania 2,106; Italy 1,939.
Universals, plates, sheets	8,312	16,563	(1)	France 12,566; Japan 2,106; Belgium-Luxembourg 1,790.
Hoop and strip	71	202	--	France 136; West Germany 30; Italy 25.
Rails and accessories	1,133	9	1	France 7.
Wire	942	858	--	France 683; China 104; Belgium-Luxembourg 35.
Tubes, pipes, fittings	4,883	5,770	6	France 3,204; West Germany 1,824; Ivory Coast 230.
Castings and forgings, rough	148	206	--	France 164; Canada 28.
Lead:				
Oxides	44	25	(1)	West Germany 15; France 10.
Metal including alloys, unwrought and semimanufactures	45	18	--	All from France.
Manganese:				
Ore and concentrate	2	2	--	Do.
Oxides	314	255	--	Gabon 240; United Kingdom 15.
Metalloids	9	13	(1)	West Germany 9; France 4.
Nickel: Metal including alloys, semimanufactures	3,169	99	(1)	France 50; Italy 41; Belgium-Luxembourg 6.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$2	--	All from France.
Silver: Metal including alloys, unwrought and partly wrought do	$41	$19	--	France $12; Belgium-Luxembourg $2; Switzerland $2.
Tin: Metal including alloys, unwrought and semimanufactures	5	7	--	Mainly from France.
Titanium: Oxides	145	48	--	France 32; Belgium-Luxembourg 12; West Germany 4.
Zinc:				
Oxides and hydroxides	18	31	--	France 24; Belgium-Luxembourg 7.
Metal including alloys:				
Scrap	--	24	--	All from France.
Semimanufactures	1	3	--	Do.
Other: Base metals including alloys, all forms	9	15	--	Spain 7; China 5; France 3.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	43	(1)	--	All from France.
Artificial: Corundum	--	2	--	Do.
Grinding and polishing wheels and stones	24	18	(1)	France 12; West Germany 3; Italy 3.
Asbestos, crude	1,177	1,047	--	U.S.S.R. 621; Canada 425.
Barite and witherite	2	--		
Boron materials:				
Crude natural borates	700	241	240	France 1.
Oxides and acids	3	6	--	All from France.
Cement	4,591	3,328	--	U.S.S.R. 2,002; France 1,306; Greece 20.
Chalk	1,452	1,452	--	France 1,229; Spain 108; West Germany 60.
Clays and clay products:				
Crude	488	318	--	France 236; Benin 38; Togo 38.
Products:				
Nonrefractory	2,891	2,121	--	Italy 952; Spain 561; France 449.
Refractory including nonclay brick	964	458	(1)	France 270; Morocco 153; Hong Kong 12.
Diamond: Industrial value, thousands	$3	--		
Diatomite and other infusorial earth	39	56	--	Belgium-Luxembourg 30; France 26.
Fertilizer materials:				
Crude, n.e.s	--	51	--	France 50; Norway 1.
Manufactured:				
Ammonia	8,514	6,740	--	United Kingdom 5,359; Ireland 1,342; West Germany 34.
Nitrogenous	6,174	11,463	--	France 10,863; Belgium-Luxembourg 600.
Phosphatic	103	50	--	All from Belgium-Luxembourg.
Potassic	15,374	17,238	--	France 10,262; Spain 6,969.
Unspecified and mixed	5	15	--	France 8; West Germany 5.

See footnotes at end of table.

Table 7.—Senegal: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Graphite, natural	1	--	--	
Gypsum and plaster	4,824	7,484	--	Morocco 5,798; Mauritania 1,632; West Germany 54.
Halogens:				
Chlorine	167	155	--	All from France.
Unspecified, value, thousands	$2	$1	--	Do.
Lime	1,734	2,074	--	France 1,366; Spain 387; Belgium-Luxembourg 320.
Magnesium compounds: Magnesite	--	64	--	Netherlands 42; Greece 19; West Germany 1.
Mica:				
Crude including splittings and waste	5	3	--	All from France.
Worked including agglomerated splittings	2	2	--	Do.
Pigments, mineral: Iron oxides and hydroxides, processed	109	52	--	West Germany 43; Spain 5; France 4.
Salt and brine	464	169	--	Netherlands 66; United Kingdom 50; France 33.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	4	1	(1)	Mainly from France.
Sodium carbonate, natural and manufactured	712	581	--	France 297; West Germany 158; East Germany 102.
Sodium hydroxide	6,166	9,331	--	France 3,014; West Germany 1,711; East Germany 1,552.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	22	75	--	All from Italy.
Worked	417	364	--	Italy 247; France 99; Portugal 17.
Gravel and crushed rock	65	145	--	France 132; Belgium-Luxembourg 12.
Quartz and quartzite	11	--	--	
Sand other than metal-bearing	42	28	--	All from France.
Sulfur:				
Elemental:				
Crude including native and byproduct	9	6	--	Do.
Colloidal, precipitated, sublimed	14,293	20,581	--	Poland 14,209; West Germany 6,370.
Sulfuric acid	65	98	--	West Germany 50; Netherlands 47.
Talc, steatite, soapstone, pyrophyllite	115	152	--	France 151; United Kingdom 1.
Other:				
Crude	114	26	--	All from France.
Oxides and hydroxides of barium, magnesium, strontium	5	9	--	West Germany 6; Belgium-Luxembourg 3.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	1,102	1,275	278	France 726; Belgium-Luxembourg 121; Morocco 58.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	21	5	--	All from Denmark.
Carbon: Carbon black	15	82	--	France 66; West Germany 15.
Coal: All grades including briquets	20	7	--	Poland 6; France 1.
Coke and semicoke	356	420	--	All from France.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	5,582	2,865	--	Algeria 798; Nigeria 787; Tunisia 455; United Arab Emirates 370.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	21,124	72,929	12	France 49,470; Nigeria 22,423.
Gasoline do	599,063	194,106	--	Saudi Arabia 70,125; United Kingdom 32,130; U.S.S.R. 15,283.
Mineral jelly and wax do	6,540	8,665	8	France 4,510; West Germany 1,881; Netherlands 1,424.
Kerosine and jet fuel do	292,803	9,385	--	Venezuela 4,867; United Kingdom 1,658.
Distillate fuel oil do	211,491	161,248	--	Saudi Arabia 61,351; U.S.S.R. 28,341; Venezuela 15,368.
Lubricants do	10,269	96,327	973	United Kingdom 11,480; France 9,758.
Residual fuel oil do	64,902	670,322	--	Trinidad and Tobago 150,996; Syria 120,912; Spain 101,212.
Bitumen and other residues do	r41,270	16,507	6	Venezuela 14,211; France 1,030.
Bituminous mixtures do	18,253	5,242	--	Venezuela 4,442; France 473.
Tars and other crude chemicals derived from coal, gas, and petroleum	123	132	(1)	Netherlands 73; France 52; Belgium-Luxembourg 5.

rRevised. NA Not available.
[1]Less than 1/2 unit.

TOGO

The mineral industry was dominated by phosphate rock, which suffered from a loss in sales in 1982. Output reportedly increased substantially over 1981, but a stockpile of about 800,000 tons remained.

Most large industrial units in Togo were either wholly or partially owned by the Government, including phosphate rock, petroleum refining, cement, and iron and steel. Owing to the poor performance of the economy, the Government closed six state enterprises, including a salt company, and announced that it would no longer subsidize ailing state enterprises. The future of the state-run iron and steel company and the petroleum company was under study.

Togo's GDP was estimated at $796.8 million.[7] Phosphate exports were 2 million tons, valued at $81.7 million. The value of phosphate exports as a percentage of total exports has been about 50%. The country's largest project for future expansion was associated with further development of the phosphate fertilizer sector.

COMMODITY REVIEW

Cement.—Ciment du Togo (CIMTOGO) was the sole producer of cement in Togo. The company commenced operation in 1971 and its ownership was shared equally between the Government and the Lambert Group of France. Initial capacity was 120,000 tons per year, but has since been increased to 500,000 tons per year. Until 1979, all production of cement had been from imported clinker.

In 1975, the Société des Ciments de l'Afrique de l'Ouest (CIMAO) was created to supply the regional clinker needs of Togo, the Ivory Coast, and Ghana. Production of clinker commenced in 1979 with a capacity of 1.2 million tons, using limestone from Tabligbo, Togo. The three countries were each committed to purchasing one-third of the clinker plant's output. Financial, technical, and management difficulties resulted in unused capacity and an uneconomic product. The International Bank for Reconstruction and Development (World Bank) approved $15 million of a total of $34.8 million restructuring project for CIMAO. The remainder was from Caisse Centrale de Cooperation Economique of France, $12.8 million, and the European Investment Bank, $7 million. Société des Ciments Français of France, as head of a management and technical assistance team, commenced work in October 1982. One-third of clinker output by CIMAO was used by CIMTOGO for cement production.

Iron and Steel.—The Société Nationale de la Siderurgie commenced operation of a single electric furnace in 1979 in Lomé with a capacity of 20,000 tons per year of liquid metal. A rolling mill with 40,000 tons per year capacity using domestic and imported steel was also operated by the company. Electricity for the plants was from a 115 megawatt thermal powerplant. Actual production from the plant has been about 25% of capacity.

Petroleum Refining.—The petroleum refinery operated by Société Togolaise des Hydrocarbures, with a capacity of 1 million tons per year, ceased operation in February 1981. About 80% of refinery production had been supplied to Nigeria.

Phosphate Rock.—Phosphate rock production and marketing was the responsibility of the state-owned Office Togolaise des Phosphates (OTP). Total production capacity at the mines of Kahotoe and Kpogame was 3.4 million tons, about 25% of which was unused owing to depressed demand. OTP contributed about 12% of all Government revenues, and it has also provided subsidies for state enterprises.

A feasibility study was underway, financed by the World Bank, for production of phosphoric acid from currently unexploited low-grade phosphate rock. Construction cost was estimated at $400 million. The second phase of the study was to commence in mid-1983. If feasible, the project would require about 50% foreign equity participation.

UPPER VOLTA

Output of mineral-related materials in 1982 was confined to small quantities of phosphate rock and unknown quantities of construction materials. However, a number of projects continued that were expected to lead to development of small-scale mining. Their startup was part of plans to reduce the country's dependency on agriculture, which suffered during years of drought.

Lack of infrastructure, particularly trans-

portation, were severe impediments to large-scale mineral industry development, in addition to depressed world markets. Plans for production were relegated to gold and other small operations.

COMMODITY REVIEW

Cement.—There was no production of cement in Upper Volta. All cement requirements were met by imports, mainly from Togo. Feasibility studies were underway to assess either the development of an integrated cement plant using limestone from Tambao, or by importing clinker for a clinker grinding plant with a 150,000-ton-per-year capacity.

Diamond.—Exploration was conducted by BGR Hanover of the Federal Republic of Germany. Four diamond structures were located in the northern Barsalogo region.

Gold.—Efforts to reopen the Poura gold mine at a cost of $100 million continued.[8] Reserves were reported to be 740,000 troy ounces of gold in ore grading 0.48 troy ounce per ton. The discovery of nearby gold mineralization has prolonged the expected life of the mine by several years. The manager of the project was the Société de Recherche et d'Exploitation Minière. The Government was the principal shareholder with 60%. Cie. Francaise des Mines of France and the Islamic Development Bank each held 20%. Mine startup was targeted for 1984 at a rate of 80,000 troy ounces per year.

The Société des Mines du Sahel (Somisa) planned production of gold at the Guiso and Bayildjoga Mines in northern Upper Volta near Dori. San Martin Mining of the United States had a 35% interest in Somisa. The remainder was controlled by the Bureau Voltaique de la Geologie et des Mines.

Gold mineralization at Diouga, also near Dori, and at Bouroum was being investigated by BRGM. Gold mineralization at Kwademen, discovered under a United Nations Development Program, continued under evaluation.

Marble.—The Compagnie Voltaique d'Exploitation was developing marble deposits at Tiara. Reserves were put at 60,000 cubic meters.

Phosphate Rock.—Phosphate resources were reported for several areas of Upper Volta. Reserves of 80 million tons grading 18% to 33% P_2O_5 were located at Kodjari. Smaller but higher grade deposits were located at Arly and Aloub Djouna. Ouput from Kodjari has been at low levels for several years and was consumed locally.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF211.3=US$1.00 for 1980 and CFAF271.30=US$1.00 for 1981.

[3]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF330=US$1.00 for 1982.

[4]Where necessary, values have been converted from Mali francs (MF) to U.S. dollars at the rate of MF543=US$1.00 in 1981 and MF710=US$1.00 for 1982.

[5]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF350=US$1.00 for 1982.

[6]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF363.6=US$1.00 for 1982.

[7]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF335.08=US$1.00 for 1982.

[8]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF370=US$1.00 for 1982.

Table 8.—Upper Volta: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Principal destinations, 1981
METALS			
Aluminum: Metal including alloys, semimanufactures	4	(1)	All to Ivory Coast.
Iron and steel: Metal:			
Ferroalloys	13	111	Ivory Coast 81; Togo 30.
Semimanufactures:			
Bars, rods, angles, shapes, sections	624	307	Niger 204; Mali 27; Ivory Coast 22.
Universals, plates, sheets	141	116	Niger 68; Ivory Coast 46.
Hoop and strip	10	--	
Tubes, pipes, fittings	13	10	Ivory Coast 4; Ghana 3.
Zinc: Metal including alloys, scrap	39	56	Ivory Coast 46; Mali 10.
Other: Base metals including alloys, all forms	22	19	All to France.
NONMETALS			
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc value, thousands	--	$2	Do.
Cement	113	187	Mali 167; Ghana 20.

See footnotes at end of table.

Table 8.—Upper Volta: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Principal destinations, 1981
NONMETALS —Continued			
Clays and clay products:			
Crude	30	--	
Products, refractory including nonclay brick	--	23	All to Ivory Coast.
Stone, sand and gravel: Dolomite, chiefly refractory-grade	734	1,685	Do.
MINERAL FUELS AND RELATED MATERIALS			
Petroleum refinery products:			
Gasoline 42-gallon barrels	34	110	Do.
Kerosine and jet fuel do	3,751	4,146	Do.
Lubricants do	14	--	

[1]Less than 1/2 unit.

Table 9.—Upper Volta: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkali, alkaline-earth, rare-earth metals value, thousands	$7	$5	$4	West Germany $1.
Aluminum: Metal including alloys:				
Scrap	469	1,145	--	Ghana 961; Nigeria 166; France 15.
Semimanufactures	408	503	(1)	Cameroon 388; France 58; Nigeria 42.
Chromium: Oxides and hydroxides	37	--		
Copper:				
Matte and speiss including cement copper value, thousands	$1	--		
Metal including alloys, semimanufactures	13	18	--	France 16; Belgium-Luxembourg 1.
Iron and steel: Metal:				
Pig iron, cast iron, powder, shot	(1)	--		
Ferroalloys	98	109	--	France 43; Ghana 41; Nigeria 10.
Semimanufactures:				
Bars, rods, angles, shapes, sections	7,040	6,666	--	France 3,801; Togo 1,076; Spain 566.
Universals, plates, sheets	13,337	6,451	--	France 4,265; Japan 1,229; Belgium-Luxembourg 691.
Hoop and strip	284	28	17	France 11.
Rails and accessories	591	677	--	France 667.
Wire	441	354	--	Belgium-Luxembourg 148; France 99; Ivory Coast 60.
Tubes, pipes, fittings	1,460	8,756	7,337	France 694; Ivory Coast 242; Spain 221.
Casting and forgings, rough	21	3	--	Mainly from France.
Lead: Metal including alloys, unwrought and semimanufactures	1	2	--	France 1.
Manganese: Oxides	1,341	942	--	All from France.
Metalloids: Unspecified	1	2	--	All from West Germany.
Nickel: Metal including alloys, unwrought and semimanufactures value, thousands	$1	$1	--	All from Ireland
Silver: Metal including alloys, unwrought and partly wrought do	$7	$2	--	All from France.
Tin: Metal including alloys, unwrought and semimanufactures	6	2	--	Mainly from France.
Titanium: Oxides	14	29	--	France 16; Belgium-Luxembourg 13.
Zinc:				
Oxides	46	25	--	All from France.
Metal including alloys, semimanufactures	99	--		
Other: Base metals including alloys, all forms	1	(1)	--	Do.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$1	$1	--	NA.
Artificial: Corundum	--	1	--	All from France.
Grinding and polishing wheels and stones	25	26	(1)	Denmark 18; France 5.

See footnotes at end of table.

Table 9.—Upper Volta: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Barite and witherite	38	40	--	All from France.
Boron materials: Oxides and acids	(1)	36	--	Do.
Cement	111,527	94,703	--	Ivory Coast 62,374; Togo 30,140; China 1,483.
Chalk	37	23	--	All from France.
Clays and clay products:				
Crude	119	142	--	France 137; Italy 5.
Products:				
Nonrefractory	1,441	586	--	France 189; China 185; West Germany 88.
Refractory including nonclay brick	5	102	--	France 62; Senegal 37.
Diatomite and other infusorial earth	144	139	--	France 138; West Germany 1.
Fertilizer materials:				
Crude, n.e.s	--	1	--	Mainly from Japan.
Manufactured:				
Ammonia	16	17	--	France 16; Netherlands 1.
Nitrogenous	3,127	2,536	--	Belgium-Luxembourg 1,763; United Kingdom 542; France 230.
Phosphatic	638	799	--	Belgium-Luxembourg 589; Netherlands 210.
Potassic	373	564	(1)	Netherlands 429; West Germany 77; France 45.
Unspecified and mixed	13,263	19,295	--	Belgium-Luxembourg 13,870; Dominican Republic 2,520.
Gypsum and plaster	88	418	--	France 406; Togo 11.
Halogens: Unspecified	1	1	--	Mainly from France.
Lime	1,097	706	--	France 644; Ivory Coast 60.
Mica:				
Crude including splittings and waste	22	7	--	All from France.
Worked including agglomerated splittings	--	(1)	--	Do.
Phosphates, crude	541	1,428	--	Do.
Pigments, mineral: Iron oxides and hydroxides, processed	67	29	--	Do.
Salt and brine	14,405	18,986	--	Ghana 11,215; Senegal 6,811; Belgium-Luxembourg 479.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including potassic and sodic peroxides	53	5	--	Mali 2; Niger 2.
Sodium carbonate, natural and manufactured	57	108	--	East Germany 87; West Germany 20.
Sodium hydroxide	1,457	1,658	--	West Germany 892; Belgium-Luxembourg 468; France 203.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	14	13	--	Togo 8.
Worked	(1)	107	--	Italy 106; France 1.
Gravel and crushed rock	35	2,123	--	All from Ivory Coast.
Sand other than metal-bearing	6	2	--	All from France.
Sulfur:				
Elemental:				
Crude including native and byproduct	27	34	--	France 33; West Germany 1.
Colloidal, precipitated, sublimed	2	2	--	All from France.
Sulfuric acid	92	64	(1)	France 54; Ivory Coast 7.
Talc, steatite, soapstone, pyrophyllite	84	65	--	All from France.
Other:				
Crude	10	13	--	France 11; Ivory Coast 2.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	153	903	--	Spain 722; France 178.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	99	153	--	All from France.
Coal: All grades excluding briquets	--	5	--	Do.
Coke and semicoke	4	3	--	Do.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	5,904	6,809	--	Ivory Coast 4,872; Nigeria 1,125; France 534.
Gasoline do	453,628	394,408	--	Ivory Coast 311,865; Venezuela 21,811; Brazil 15,249.

See footnotes at end of table.

Table 9.—Upper Volta: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products —Continued				
Mineral jelly and wax 42-gallon barrels	1,818	1,755	--	Netherlands 952; France 433; West Germany 268.
Kerosine and jet fuel ---do---	84,095	93,070	--	Ivory Coast 60,008; Brazil 26,706.
Distillate fuel oil ---do---	202,867	174,295	--	Ivory Coast 123,224; Brazil 27,833; Netherlands 9,027.
Lubricants ---do---	19,740	20,167	7	Ivory Coast 16,296; France 2,520.
Residual fuel oil ---do---	333,506	295,831	--	Ivory Coast 290,023.
Bitumen and other residues ---do---	7,060	19,216	--	Spain 19,071; France 145.
Bituminous mixtures ---do---	9,641	5,287	--	Ivory Coast 5,121; France 158.
Tars and other crude chemicals derived from coal, gas, and petroleum	38	36	--	Netherlands 29; Belgium-Luxembourg 4.

NA Not available.
[1]Less than 1/2 unit.

The Mineral Industry of the Islands of the Caribbean

By Doris M. Hyde[1]

CONTENTS

Mineral industry activity in many of the smaller Caribbean Island countries has remained minimal. For this reason, specific references to Bermuda, Guadeloupe, Martinique, and the Netherlands Antilles have been removed from textual and trade table presentations. Any significant future developments will be reported as they occur. Readers are referred to earlier Minerals Yearbook editions for previous information. Table 1 production statistics have been modified in some instances. References to certain nonmetal commodities were eliminated because information has often been unreliable. Their inclusion in table 1 was not considered important to either an overview of the area or to compatibility with volume I of the Minerals Yearbook.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Area[2] and commodity	1978	1979	1980	1981[p]	1982[e]
BAHAMAS[3]					
Cement, hydraulic thousand metric tons	330	450	472	29	71
Petroleum refinery products:[e]					
Jet fuel thousand 42-gallon barrels	9,160	r8,550	8,160	8,200	8,000
Distillate fuel oil do.	9,885	r11,930	11,210	11,500	11,000
Residual fuel oil do.	34,565	r36,410	35,750	36,000	35,000
Other do.	11,080	r11,140	11,360	11,500	11,000
Refinery fuel and losses do.	900	r1,460	1,400	1,450	1,300
Total do.	65,590	r69,490	67,880	68,650	66,300
Salt thousand metric tons	1,633	440	684	970	4816
Stone:					
Aragonite do.	3,200	3,629	3,266	3,423	3,049
Limestone for cement manufacture do.	524	508	550	532	--
Sulfur, byproduct of petroleum[e] do.	5	5	5	5	5

See footnotes at end of table.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area[2] and commodity	1978	1979	1980	1981[p]	1982[e]
BARBADOS[3]					
Gas, natural:					
Gross[e] million cubic feet	444	548	584	450	550
Marketed do	152	266	311	284	350
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	r274	r284	305	211	265
Refinery products do	1,209	1,295	1,364	1,408	1,455
CUBA[3 5]					
Cement, hydraulic thousand metric tons	2,712	2,613	2,831	3,292	4,3,163
Chromite do	29	28	29	21	4,27
Cobalt[6]	r1,463	r1,230	1,613	1,715	1,500
Copper, mine output, metal content	2,821	2,840	3,350	2,877	4,2,673
Gas, natural:					
Gross[e] million cubic feet	1,500	1,500	1,560	1,450	2,000
Marketed do	r834	r660	630	470	4,378
Gypsum thousand metric tons	95	91	122	130	127
Iron and steel: Crude steel do	324	328	304	330	4,301
Nickel:					
Mine output, Ni-Co content of oxide and sulfide	34,787	32,324	38,230	40,300	4,37,600
Metallurgical products, Ni content:[6]					
Granular oxide and powder	8,634	8,095	7,959	8,500	8,990
Oxide sinter	9,456	10,730	11,852	12,151	11,760
Sulfide	15,234	12,269	16,806	17,933	15,350
Total	33,324	31,094	36,617	38,584	36,100
Nitrogen: N content of ammonia thousand metric tons	39	155	136	167	4,98
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	1,918	1,917	1,819	1,684	4,3,600
Refinery products:					
Motor gasoline do	7,537	7,412	6,936	8,410	4,7,310
Kerosine do	r3,317	r3,221	3,416	3,330	4,3,550
Distillate fuel oil do	r7,831	r7,912	7,869	8,080	4,8,150
Residual fuel oil do	r20,526	r21,271	19,981	21,310	4,21,830
Lubricants do	885	930	957	920	4,1,000
Liquefied petroleum gas do	r1,184	r1,074	1,238	1,200	4,1,300
Other do	r3,233	r2,780	3,940	3,520	4,200
Total do	r44,513	r44,600	44,337	46,770	47,340
Pyrite, gross weight thousand metric tons	54	29	53	e50	50
Salt do	131	122	131	161	4,198
Sulfur:					
S content of pyrite[e] do	r21	12	22	21	20
Byproduct of petroleum[e] do	8	8	8	8	8
Total do	r29	20	30	29	28
DOMINICAN REPUBLIC[3]					
Aluminum: Bauxite, dry equivalent, gross weight do	568	524	510	405	160
Cement, hydraulic do	867	886	1,015	951	940
Copper, mine output do	--	3	3	3	3
Gold thousand troy ounces	343	353	370	408	400
Gypsum:					
For cement manufacture thousand metric tons	r239	173	185	180	180
Other do	e2	e2	50	24	30
Iron and steel ferroalloys: Ferronickel[7]	37,631	66,072	43,019	49,971	14,100
Lime	e25,000	37,935	e40,000	e40,000	40,000
Mercury 76-pound flasks	r449	r281	159	77	49
Nickel:[7]					
Mine output, metal content	e14,302	e25,111	16,347	18,689	5,273
Metal, smelter, Ni content of ferronickel shipments	19,759	24,553	16,552	18,679	5,484
Petroleum refinery products thousand 42-gallon barrels	9,761	9,324	9,841	10,529	10,250
Salt	37,877	e38,000	55,556	e60,000	60,000
Silver thousand troy ounces	1,848	2,276	1,623	2,034	2,200

See footnotes at end of table.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area[2] and commodity	1978	1979	1980	1981[p]	1982[e]
GUADELOUPE[3]					
Abrasives, natural: Pumice thousand metric tons	200	200	250	240	240
Cement do	162	143	183	160	160
HAITI[3]					
Aluminum: Bauxite, dry equivalent, gross weight do	580	584	312	427	377
Cement, hydraulic do	249	r237	243	229	230
JAMAICA[3]					
Aluminum:					
Bauxite, dry equivalent, gross weight do	11,739	11,618	12,054	11,682	8,380
Alumina do	2,117	2,094	2,456	2,556	1,700
Cement, hydraulic do	294	226	144	165	160
Gypsum	134,500	r47,600	105,300	186,758	180,000
Lead, refined (secondary)[e]	2,000	2,000	1,000	1,000	1,000
Lime thousand metric tons	157	204	159	133	130
Petroleum refinery products thousand 42-gallon barrels	9,086	9,922	8,201	5,758	5,570
MARTINIQUE[3]					
Cement, hydraulic thousand metric tons	144	144	180	180	200
Petroleum refinery products thousand 42-gallon barrels	3,988	4,011	3,990	4,357	4,320
Pumice thousand metric tons	156	166	153	156	156
NETHERLANDS ANTILLES[3]					
Petroleum refinery products:[e]					
Gasoline:					
Aviation thousand 42-gallon barrels	1,530	r1,820	1,640	1,600	1,600
Motor do	18,172	r24,050	25,700	28,000	25,000
Kerosine do	432	r710	620	600	600
Jet fuel do	15,317	r12,750	12,820	13,000	12,000
Distillate fuel oil do	28,055	r27,000	26,750	27,000	26,000
Residual fuel oil do	110,996	r126,650	129,000	130,000	126,000
Lubricants do	3,355	r4,350	4,540	3,500	4,000
Other do	26,961	r7,650	8,280	9,000	8,000
Refinery fuel and losses do	9,928	r4,350	5,000	5,000	4,000
Total do	214,746	r209,330	214,350	217,700	207,200
Phosphate rock thousand metric tons	81	49	--	--	--
Salt[e] do	400	400	400	400	400
Sulfur, byproduct of petroleum do	95	91	91	90	90
ST. VINCENT[3]					
Salt do	50	50	50	50	50
TRINIDAD AND TOBAGO[3]					
Asphalt, natural do	r63	r56	41	23	430
Cement, hydraulic do	r223	r218	186	139	4189
Gas, natural:					
Gross million cubic feet	157,958	169,740	197,860	195,399	4206,237
Marketed do	96,300	113,000	128,800	137,600	140,000
Iron and steel:					
Iron, sponge thousand metric tons	--	--	22	180	4218
Steel, crude do	--	--	3	53	4171
Semimanufactures (wire rod) do	--	--	--	29	4124
Lead, refined (secondary)[e]	2,000	2,000	2,000	2,000	2,000
Natural gas liquids thousand 42-gallon barrels	60	r39	40	e40	35
Nitrogen: N content of ammonia	400,772	388,654	459,235	348,340	704,600
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	r83,788	78,249	77,616	69,112	464,618
Refinery products:					
Gasoline:					
Aviation do	354	271	375	284	200
Other do	16,795	14,827	15,241	12,822	12,000
Kerosine do	4,501	3,245	3,247	2,145	2,000
Jet fuel do	2,219	r2,521	3,202	1,264	1,100
Distillate fuel oil do	10,134	11,741	13,991	10,279	9,000
Residual fuel oil do	r45,481	43,521	42,286	29,613	25,000
Lubricants do	725	686	1,012	787	700
Other:					
Liquefied petroleum gas do	610	759	869	901	900
Asphalt do	r171	r276	273	403	400
Unspecified do	r2,573	r2,490	2,424	2,150	2,000

See footnotes at end of table.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area[2] and commodity	1978	1979	1980	1981[p]	1982[e]
TRINIDAD AND TOBAGO[3] —Continued					
Petroleum and refinery products —Continued					
Refinery products —Continued					
Refinery fuel and losses thousand 42-gallon barrels	[r]2,319	[r]2,526	1,680	2,696	1,807
Total do	85,882	[r]82,863	84,600	63,344	[4]55,107
Sulfur, byproduct of petroleum[8] thousand metric tons	54	77	57	44	40

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through June 3, 1983.

[2]In addition to the countries listed, Antigua, Bermuda, Dominica, Grenada, Montserrat, and St. Lucia presumably produced crude construction materials (clays, sand and gravel, and stone), but output is not always available, and information is inadequate to make reliable estimates of output levels. Antigua also has a petroleum refinery that was closed in 1976 but became operational again for a short period in 1982.

[3]In addition to the commodities listed, crude construction materials (lime, salt, sand and gravel, etc.) may also be produced, but data on such production are not always available, and information is sometimes inadequate to make reliable estimates of output levels.

[4]Reported figure.

[5]In addition to the commodities listed, iron ore and manganese ore presumably were produced during the period covered by this table, but available information is inadequate to make reliable estimates of output levels.

[6]Annario Estadistico de Cuba provides figures on nickel-cobalt content of granular and powder oxide, oxide sinter, and sulfide production. Using an average cobalt content in these individual products of 0.9% in total granular and powder oxide, 1.1% in total oxide sinter, and 4.5% in total sulfide, the cobalt content of reported Ni-Co production was determined as being 1.16% of granular and powder oxide, 1.21% of oxide sinter, and 7.56% of sulfide. The remainder of reported figures would represent the nickel content.

[7]The Dominican Republic reports gross weight of ferronickel production. When official data are not available, figures for nickel content of mine production is determined from an average of 37.4% Ni contained in ferronickel production. Nickel content of ferronickel shipments is obtained from Falconbridge Dominicana C. por A. annual reports.

[8]Limited quantities of sulfur as a byproduct of natural gas may also be produced.

BAHAMAS

Generally poor worldwide economic conditions had some adverse impact on the Bahamas, but, overall, its economy did not suffer to the extent of some developing countries in the Caribbean. Tourism remained the greatest contributor to the economy, followed by the banking and financial sector. In 1981, the contribution of the mineral and mineral-related sector to the economy declined almost 3% from the 11% reported for 1980, following a trend toward decreased demand for Bahamian export-oriented products.

For the past several years the rate of unemployment has been stable at about 22%. New industrial activities have been slow to develop, despite advantages offered through free trade zones and tax exemptions. The balance-of-trade deficit continued to worsen. In 1981, nonfuel imports totaled about $552 million and increased the balance-of-trade deficit to $375 million, or 12% over that of 1980. The cost of oil imports in 1981 was estimated at $273 million.

In 1982, owing to low product demand in the United States, the Bahamas Oil Refining Co., owned by Charter Oil Co. and Standard Oil Co. of California, reportedly operated considerably below its 500,000-barrel-per-day capacity. The crude oil transshipment terminal, located at South Riding Point on Grand Bahama Island, was also underutilized during 1982.

The Bahamas Cement Co. plant was closed during most of 1981 and 1982. A Swedish construction materials company was reported to be interested in obtaining a 25% interest in the company. Domestic cement requirements were met through imports from Cuba. In 1983, it was reported that the Bahamas would probably import cement from Florida rather than Cuba because of quality and other considerations.

At the end of March 1982, amendments were made to the Petroleum Act of 1971 and the implementing regulations of 1978. The international oil companies were more receptive to this new Petroleum (Amendment) Act of 1982 than they were to the earlier legislation. The new act allowed crude oil prices for the purpose of royalties to be determined by the average of prevailing market prices. For all practical purposes, the previous legislation permitted the price to be set by the Minister of Economic Affairs. The licensee, and not the Government, was given the authority to decide the

commercial prospects of any discovery. Besides monies for application fees, rents, and signature bonuses, the regulation provided for the Government to receive royalties of at least 12.5% after production begins. All production may be exported, except that which the Government may take instead of a cash royalty. Also, the Government may require up to 25% of output be sold to local refiners at prices keyed to U.S. gulf product prices.

A seismic survey permit reportedly cost $5,000, and licenses and leases cost $10,000 per block (one block encompasses about 10 square nautical miles). Signature bonuses have been reported as ranging from $1 million to as much as $9 million.

Getty Oil (Bahamas) Co. Inc. was the first major company awarded a petroleum exploration license under the new Petroleum (Amendment) Act of 1982. Getty expected to conclude its geophysical studies within 30 months. Getty's licenses were in 2 separate areas comprising a total of 50 blocks and encompassing about 4.3 million acres. The two areas were located northwest and southeast of Andros Island.

Breoco Ltd., a Bahamian subsidiary of REO Development Corp. of Tulsa, Okla., was the second company to be awarded exploration rights. Breoco's tract included 1,500 square nautical miles on Little Bahama Bank and extended into the northern onshore coastal area of Grand Bahama Island. Breoco's expected program costs were reported as $15 million, which included the cost of drilling one well.

Natomas Petroleum (Bahamas) Ltd., a subsidiary of Natomas Co., was awarded licenses for two blocks covering about 2,000 square nautical miles of the Grand Bahamas Bank, south of Andros Island and west of Getty's southernmost block. This prospect was established as a joint venture between Natomas Petroleum (67%) and BP Petroleum Development Ltd. (33%).

Exxon Corp. applied for an area lying west of Andros Island and to the north of the Natomas Petroleum and Getty blocks. Standard Oil Co. of California sought two licenses in the Santaren Channel, between the area of Exxon's application and Cay Sal Bank.

BARBADOS

In 1981, the gross domestic product (GDP) reached $819 million,[2] but in real terms represented a decline of almost 3%. The decline was attributed almost entirely to decreased output from the export sectors of sugar and manufactured goods, as well as declining tourism. In 1982, the economic output was expected to fall another 2%. Unemployment during the third quarter of 1982 increased to almost 15% of the work force, 3% higher than during the same period in 1981. Barbados' balance-of-trade deficit continued to deteriorate.

Barbados has not had full participation in the Mexico-Venezuela oil facility program. Petroleum imports were limited to Venezuelan crude oil because Barbados was not able to accommodate the Mexican crude oil in its refinery. In the 1-year period ending August 2, 1981, Barbados imported 581,000 barrels of Venezuelan crude, valued at $18.7 million, with $5.6 million financed by Fondo de Inversiones (FIV), the Venezuelan investment fund. In the 1-year period ending August 2, 1982, Barbados imported 568,000 barrels of crude oil valued at $19.5 million, with almost $5.9 million financed by the FIV.

Two loans for energy programs were granted to Barbados during 1982. A portion of a $2.7 million International Bank for Reconstruction and Development (World Bank) loan was to be used to provide consultant services for energy conservation. A permanent conservation entity was to be created for the purpose of developing local expertise, motivating consumer conservation, and improving the transportation system. The Inter-American Development Bank (IDB) approved a $1.5 million technical cooperation grant to determine the potential for wind-driven electricity generation and included the installation of a 200-kilowatt wind turbine. All data from the pilot project were to be made available to other Caribbean countries.

At the end of July, Mobil Oil Corp. sold its 25,000-acre Woodbourne Field drilling lease, production facilities, and crude oil reserves to the state-owned National Petroleum Co. The $12 million selling price did not include Mobil's refinery and retail operation. Crude oil reserves were estimated at 850,000 barrels. Mobil was to manage the operation for 2 months, until settlement. The Government was unable to secure financing by the September settlement date. In December, it appeared that Barbadc

would negotiate a loan agreement with a banking syndicate headed by Morgan Guaranty Trust Co., but the year ended with Mobil reportedly still operating the field. In November, the Government signed a technical cooperation agreement with Canada's oil development aid agency, Petro-Canada. Petro-Canada was to assume operation responsibilities after financial arrangements were concluded between Barbados and Mobil.

In 1982, crude oil production averaged about 730 barrels per day. By the end of 1982, daily output had reached about 1,000 barrels per day. The Government announced a production target of 1,200 barrels per day by mid-1983.

CUBA

In 1981, Cuba's second 5-year plan (1981-85) projected an average annual growth rate of 5% for the period. By mid-1982, it became apparent that this average growth rate was unachievable in 1982, and new projections set a more realistic 1982 growth rate of 0% to 1%. Cuba was subjected to adverse economic pressures not unlike those endured by neighboring Latin American countries. Inflation, estimated to be as much as 12% in 1981; unemployment, somewhat obscured by underemployment, military service, and technicians serving abroad; production and investment cutbacks; shortages of materials resulting from import curbs; trade and budgetary deficits; and burdensome foreign debts represented some of the problems Cuba faced in 1982.[3]

Cuba's hard currency debt was estimated to be as much as $3.5 billion,[4] of which $1.2 billion in principal was scheduled for repayment between 1982 and 1985. Cuba asked foreign creditors to reschedule the principal payments over 10 years with a 3-year grace period. The lenders, which included Canadian, European, Middle Eastern, and Japanese banks, were still considering the proposal at the end of 1982. Cuban debt to member nations of the Council for Mutual Economic Assistance, principally the U.S.S.R., was reported at an additional $8 billion, with an estimated $5 billion in repayments to start in 1986.

On February 15, 1982, Cuba enacted Decree Law 50, which authorized the Government to enter into joint ventures with foreign investors, including state-owned companies and private capital, regardless of national origin. U.S.-based companies would not be able to participate because of U.S. Government policies. The joint ventures may be located in Cuba or in those countries where Cuba has established favorable political and/or economic relationships. The law provided generous investment incentives, which included the following: foreign partner ownership of up to 49% of the venture, and majority ownership in special cases; possible full repatriation of profits; tax exemption on dividends, gross income, and executive salaries; a lenient policy toward autonomy in personnel staffing; and the importation of supplies when locally produced material is not competitive. The Government stressed a flexible attitude toward negotiating all aspects of business details. Also emphasized was the prospect of a stable, educated work force whose modest official wage levels are determined by the Government.

Cuban benefits from such joint ventures would include an expansion of export opportunities with hard currency countries and the establishment of industries in Cuba that would lessen import needs and increase the availability of hard currency through expanded tourism facilities. Other gains would be increased employment, worker training, transfers of technology, new models of management, an opportunity to expand Cuba's industrial and commercial base, and the establishment of improved relations with the market economy countries. Joint venture companies would pay a social security tax equivalent to 25% of the salaries of local employees and a tax not to exceed 30% on company net profits.

Imports of crude oil and petroleum products accounted for almost 60% of available energy. Crude oil requirements were 97% imported through the U.S.S.R. at a cost considerably less than the world market price. Plans for the country's first nuclear powerplant at Cienfuegos were reportedly approved by Cuban technicians. The first stage of the 850-megawatt facility was expected to go onstream within 5 years; however, this may prove to be an optimistic timeframe.

Construction at the new Punta Gorda nickel plant near Moa was reported to be about 55% complete and it was expected to be operational by 1985. The cost for the 30,000-ton-per-year plant was placed at $570

million, although some reports estimated the cost at $200 million higher. A 20-ton-per-day pilot plant was under construction at the Punta Gorda site. The pilot plant was expected to be completed in mid-1983 and used for laterite processing research studies, the development of control systems, and the testing of new equipment. Another $100 million investment was estimated for the upgrading in progress at the Pedro Sotto Alba nickel plant at Moa. When completed, the Moa plant capacity was expected to increase from 18,000 to 24,000 tons per year. A new lift for moving ore from storage areas to a conveyor has been installed and a new electrostatic filter unit awaited installation.

Initial construction on Cuba's fourth nickel plant, the Las Camariocas project, reportedly began in 1982, but without much progress as the completion of Punta Gorda became the overriding priority. Las Camariocas was designed to add another 30,000 tons per year to Cuba's nickel processing capacity by the end of this decade. Some analysts regarded Cuba's new nickel projects as an indication that it may be expected to seek a larger share of the world market, perhaps placing economic pressure on other producers with higher break-even prices.

Cuba's crude oil production level increased substantially starting in November 1981, from 151,000 barrels per day during October to 195,000 barrels per day. This increase was sustained, and by the end of 1982 accumulated crude oil production was more than double that of 1981. On the other hand, reported natural gas production declined 25% from that of 1981, when it averaged slightly more than 1 million cubic feet per day. Official Cuban figures on natural gas production may represent only marketed production and not include that portion consumed by the producer, vented, or reinjected.

Mexico's state-owned oil company, Petróleos Mexicanos, continued its cooperation with Cuba in exploring for petroleum off the northern coast of Pinar del Río Province. In 1981, it was erroneously reported by the press that a large crude oil deposit had been found in this area. Technicians from the U.S.S.R. have begun exploratory work in western Cuba. It was reported that wells about 2,500 feet deep have been drilled both onshore and offshore.

DOMINICAN REPUBLIC

The economy of the Dominican Republic continued to deteriorate during 1982. The 1982 GDP was estimated at almost $8 billion. As measured in constant 1970 dollars, there was no real growth in the 1982 GDP, which in 1981 had increased more than 3% over that of 1980. The external public debt continued to rise, and in 1982, it approached $2 billion, a 13% increase over the 1981 level. Servicing this debt was estimated to cost over $300 million annually.

The trade deficit worsened as volumes and prices for principal export commodities generally declined. The unemployment level reached 30% in 1982, and the rate of inflation was officially estimated at 15%. Late in 1982, the Government obtained a $455 million loan package from the International Monetary Fund. The Government undertook major tax reforms, tightened import controls, and imposed other stringent measures to combat economic problems.

The export value of the three major mineral products, bauxite, doré, and ferronickel, are shown in the following table, in millions of dollars:

Commodity	1978	1979	1980	1981	1982[e]
Bauxite	$23	$21	$19	$16	$6
Doré	[r]73	128	260	208	161
Ferronickel	[r]73	23	101	111	24
Total	[r]169	272	380	335	191
Share of total exports	25%	31%	[r]40%	28%	25%

[e]Estimated. [r]Revised.

Source: Boletin Mensual, Banco Central de la Republica Dominicana.

Petroleum import costs rose slightly to an estimated $600 million in 1982. The primary export, sugar, lost about 83% in per pound value in 1982, drastically reducing the inflow of foreign exchange. Poor market demand for bauxite and nickel caused producers to severely curtail their Dominican operations. Average precious metal prices declined, but did begin an upward swing toward the end of the year. Nevertheless, the 1982 value of gold and silver sales was 22% less than that received in 1981 for slightly less volumes. The 1982 trade deficit was estimated at $642 million, a 158%

increase over the 1981 deficit. Import controls and other economic measures prevented an even larger trade deficit.

The Dominican Republic placed new legislation under consideration that would eliminate some of the negative aspects of Foreign Investment Law 861 of 1978, which governed all foreign investment registered within the Central Bank, except mineral investments. A mixed private and public sector commission on foreign investment was established in 1982 for the purpose of improving the investment climate. New investment in mining was among the commission's objectives. Exploration activities have indicated that the Dominican Republic has base metal deposits that hold promise as sources of future foreign exchange earnings.

A presidential commission was reviewing the mining sector and expected to issue recommendations for changing mining policy. The recommendations would probably include the creation of a new entity to oversee the Government's own mining activities and renew permission for private sector participation in exploration activities.

Cooperative mineral exploration with the Federal Republic of Germany's Institute of Geosciences and Natural Resources established two areas for further study. Exploration of a copper occurrence at Pedro García in the Cordillera Septentrional of Puerto Plata Province was discontinued in favor of mineral deposits with easier access and possibly more immediate exploitation potential. At Palma Picada, Valverde Province, test drilling was undertaken to ascertain the extent of lead and zinc deposits. Volcanic deposits of pozzolan found in the Imbert area of Puerto Plata Province were under study to determine their possible commercial quality and quantity.

Studies of other mineralized areas included Las Cañitas, Santiago Province, and Los Hojanchos, La Vega Province (base metals); Sabaneta, Santiago Rodríguez Province (copper); Miches, El Seibo Province (gold); the northwest corner of Monte Cristi Province and Punta Santanilla, Peravia Province (iron- and titanium-bearing sands); northeastern Barahona Province (marble); and Puerto Plata Province (amber). Negotiations have been reinitiated with Hullera Vasco-Leonesa S.A. to form a joint venture to exploit base metals in the Yujo River Basin near Jarabacoa, La Vega Province. Negotiations were also underway with a West German firm to exploit the iron and titanium sand near Monte Cristi.

Because of the depressed international aluminum market, the Aluminum Co. of America (Alcoa) curtailed bauxite mining with the objective of only meeting stockpile requirements. At the same time the company increased limestone mining and was able to utilize employees who otherwise would have been laid off. Limestone exports totaled 265,000 tons valued at $1.6 million, down slightly from that of 1981. In 1960, Alcoa obtained 16% of its total bauxite requirements from the Dominican Republic. By 1980, this share had dropped to about 5%, and in 1982, was less than 2%. Alcoa did not expect to export bauxite from the Dominican Republic in 1983.

The United Nations Development Program (UNDP) agreed to initiate a 3-year project to evaluate alluvial gold deposits in the Miches region north of Hato Mayor in El Seibo Province. Work was to include about 750 test holes. If the study proves favorable, the UNDP and the Government planned to jointly develop the deposits using more modern mining methods than those presently employed by local prospectors.

Gold deposits in the Madrigal region of western San Cristóbal Province were also under study, as were the gold prospects surrounding the Pueblo Viejo Mine, especially at Los Cacaos and Jerez No. 1. Gold production has reportedly started at the Monte Negro deposits.

The new gold refinery was scheduled to come onstream in 1982 at a cost of over $5 million, enabling the Dominican Republic to produce gold and silver bullion from its doré that has been refined in New Jersey and Switzerland. However, test runs were delayed until early 1983. Construction of the refinery was controversial because of its high cost, the limited mine life of the Pueblo Viejo oxide ore (estimated at 6 more years), and uncertainty as to whether the sulfide ore at the mine can be processed in this refinery. It was reported that the mining of these sulfide ores would begin in 4 years and extend Pueblo Viejo's mine life by 20 years. In 1982, Rosario Dominicana Mines S.A. received an average of $373 per troy ounce for its gold production.

In mid-January 1982, Falconbridge Dominicana C. por A. (Falcondo) shut down its ferronickel mine and plant because of continued poor market demand and high inventories. The company negotiated a new labor contract that granted a 2-year wage freeze

and reduced fringe benefits. The plant reopened in September and operated at about 50% of capacity for the remainder of the year. Falcondo continued to explore its Cerro de Maimon prospect, located a few kilometers southeast of its Bonao ferronickel plant. The prospect was under study to determine the extent and average grade of a near-surface copper-zinc sulfide mineralization, which also contains some gold and silver.

Preliminary studies indicated the presence of 46 million tons of recoverable lignite reserves at Sánchez, Samaná Province. The lignite was estimated to average 4,680 British thermal units (Btu) per pound and could supply a 50- to 100-megawatt powerplant over a period of 20 years. The lignite resource base was estimated at 86 million tons. Recent work determined that the presence of ground water would not interfere with mining activity. A prefeasibility study, funded by Rosario, was initiated by Carbones S.A. in December. Carbones was an affiliate of Rosario. To the south, across the Bahia del Samaná near Valle in El Seibo Province, geologically older lignite deposits were also under study. The Valle deposits were thought to contain a higher Btu potential than the Sánchez deposits.

Early in 1982, the Italian Government donated funds to evaluate volcanic fields and thermal springs in the southwestern area of the Dominican Republic. In this program, an Italian firm examined geothermal energy potential of the Azua, Constanza, and Barahona areas. A possible geothermal source was found at Las Yayas de Viajama, northwest of Azua, and a prefeasibility study was undertaken to locate drilling sites. The U.S. Geological Survey and the Los Alamos National Laboratory have both expressed interest in conducting a geothermal exploration program in the Dominican Republic.

HAITI

Measurements of Haiti's recent economic growth have been hampered by the lack of adequate data. For fiscal year 1982, the GDP was about $2 billion as measured in current dollars.[5] It was estimated that the rate of real growth was 0.3%, about the same as that of 1981.

In response to severe economic pressures, Haiti operated under a general fiscal austerity program, and in 1982 undertook additional reforms to decrease the outflow of foreign exchange and increase customs and tax receipts. The Government expected a future loss of over $6 million in taxes because of the closure of the bauxite mining operation.

Haiti's new investment code has yet to be completed, but many of the provisions to be incorporated have already been decreed separately. These included tax holidays, duty-free entry of goods that are to be reexported, repatriation of all profits, and import protection measures.

In 1982, Reynolds Haitian Mines Inc. ceased bauxite mining after 25 years of operation in the area of Miragoâne. The depressed state of the aluminum industry and the poor commercial quality of the remaining ore were cited as the primary reasons for closing. It was estimated that during the 1970's the small operation brought about $15 million per year into the Haitian economy through contributions to foreign exchange, taxes, and surplus electricity. For 1982, it was estimated that Reynolds Haitian would pay about $6.5 million in taxes alone. The Government was considering possible alternative actions to keep the mine in operation, but no firm plans were announced.

With the exodus of Reynolds Haitian, the mineral industry in Haiti came to a virtual standstill. No information was available on various ongoing exploration projects, which included coal in the Maissade region of west-central Haiti, gold deposits in northern Haiti, and petroleum in the eastern Plateau Central area.

JAMAICA

In 1982, Jamaica sustained the slight upturn in economic growth registered in 1981. Real growth was estimated at 1% in 1982, as the GDP reached an estimated $3.2 billion[6] at current prices. Failure to meet the targeted growth rate of 4% was primarily attributed to a continued slump in the world aluminum industry, which caused local bauxite and alumina producers to severely curtail production. The rate of

inflation during 1982 was estimated at about 7%, much better than the almost 13% rate for 1981 and quite encouraging compared with the 23% average for the 1976-80 period.

Jamaica's bauxite and alumina companies made downward production adjustments during 1982, which affected foreign exchange and revenue earnings and placed an increased strain on the Government's 1982 and future budgetary planning. The bauxite sector's contributions to fiscal year 1982-83 net foreign exchange inflow from the payment of levies, royalties, and other local costs were expected to amount to about $250 million, a 24% decrease from that of 1981. The share contributed by only the production levy and royalty payments for fiscal year 1982-83 dropped to an estimated $112 million, a 45% decrease from that of 1981.

On the positive side of the economy, the Government continued to emphasize and seek the development of new foreign investment, and suggested that new export incentives would be forthcoming as well as a liberalization of the unofficial currency exchange, or parallel market. It was expected that the Government would officially recognize a two-tiered foreign currency exchange system.

A new state agency, Jamaica National Investment Promotions, was created to encourage and monitor investment. The Government has offered new fiscal incentives to encourage investment, and the new promotion agency was to help expedite processing by acting on the investor's behalf with other Government agencies. Preferred new investments were those that could be earners or net savers of foreign exchange, be significant employers of labor and contributors to domestic income, complement existing industries, and utilize local raw materials.

Early in 1982, Jamaica and the United States signed a taxation agreement that permitted U.S. tax credits on income taxes paid in Jamaica by U.S. businesses operating in that country. The Jamaican Government expected the agreement to bring new foreign investment to Jamaica as well as benefit established U.S. companies, including the bauxite and alumina producers. There appeared to be legal questions as to whether any or a portion of the bauxite levy payments would be considered as income tax. When Jamaica imposed the bauxite levy in 1974, the corporate income tax, as such, was eliminated. Jamaica contended that the new agreement made provisions for a certain portion of the production levy to be treated as income tax and, therefore, would be eligible for foreign tax credits. The bauxite companies were not confident that U.S. tax officials would change the classification of the levy from that of a royalty payment to one that recognized that at least a part of the levy was equivalent to an income tax.

The current bauxite production levy agreement expires in 1983, and both the Government and producers were preparing for a renegotiation. The Government appeared committed to a continuation of the levy in the belief that the companies should focus on achieving economies through expanded output and the development of fuel-efficient operations.

Jamaica sought out new trading opportunities for bauxite and alumina production. An agreement, estimated to be worth $20 million in net foreign exchange earnings, was concluded with the Soviet Union for its purchase of 1 million tons of bauxite per year starting in 1984. A preliminary shipment of 200,000 tons was scheduled for 1983. The new contract replaced an earlier contract for the purchase of 250,000 tons of alumina starting in 1984. In the past, Jamaica's bauxite ore was exported solely to the United States.

After the delivery of 1.6 million tons of bauxite to the U.S. Government strategic mineral stockpile in 1982, Jamaica began negotiating for the sale of an additional 1 million tons for 1983 delivery. An agreement between the United States and Jamaica for this sale was expected to be finalized in early 1983. This sale was anticipated to be on a cash basis, as opposed to the earlier sale, which was a combined cash-barter transaction. Other efforts were underway to increase bauxite and alumina exports while at the same time serving to reduce Jamaica's foreign exchange requirements to finance imports. In November, the Government-owned Bauxite and Alumina Trading Co. of Jamaica Ltd. finalized a countertrade agreement with General Motors Corp. to exchange alumina for motor vehicles, heavy equipment, and machinery. Jamaica was to supply 270,000 tons of alumina over a period of 3 years in return for General Motors products valued at $6 million per year. General Motors reportedly sold the alumina to a Norwegian nonferrous metal producer.

The Government had negotiations underway with Chrysler Corp. to exchange alumina for vehicles. Jamaica planned to utilize the exchange of its share of bauxite and

alumina production to obtain other needed products, such as heavy machinery and, coincidently, stimulate trade opportunities and conserve foreign exchange reserves.

New contracts with the National Workers Union, which represents the bauxite workers, were concluded in February. Strike activity began in early January, and the alumina plants were shut down until settlement.

In October, Jamaica Reynolds Bauxite Partners Ltd. made additional downward adjustments in production, from operating at 60% of its 2.8-million-ton-per-year capacity to only 18%.

Also in October, Kaiser Jamaica Bauxite Co. announced a reduction in its mining and shipping to about 25% of capacity. Kaiser Jamaica, like Jamaica Reynolds, blamed the weak state of the aluminum market. This action followed a Jamaica Reynolds decision in August to invest $2.5 million to rebuild loading docks at Ocho Rios and to initiate the use of 100-metric-ton ore-hauling trucks. Each truck was built using 45,000 pounds of aluminum produced from Jamaican bauxite. Jamaica Reynolds also announced that the Reynolds Mineral Resource Development Center would move to Jamaica and offer training programs to its local professional employees.

In mid-1982, Jamalcan, majority owned and operated by Alcan Jamaica Co., announced it would reduce alumina output to about 800,000 tons for 1982. In May, Alcoa Minerals of Jamaica, majority owner and operator of Jamalco, announced that it would cut 1982 alumina production to about 216,000 tons. Alcoa Minerals allocated capital investments that were expected to increase alumina capacity from 550,000 to 800,000 tons per year by 1985. In 1968, the Aluminum Co. of America obtained 17% of its total bauxite requirements from Jamaica. By 1980, this percentage had dropped to about 12%, and in 1982, amounted to 8% of total requirements.

In 1982, Alumina Partners of Jamaica (ALPART) contracted for the installation of a new 15-kilometer conveyor belt from its mine area in Essex Valley to the alumina plant at Nain. The $45 million conveyor was scheduled to become operational in late 1983 with a rated annual capacity of 6 million tons of bauxite. However, in May, ALPART began reducing alumina capacity at its 1.2-million-ton-per-year plant and expected to produce about 600,000 tons in 1982. Later in the year, there were reports that ALPART intended to close their Jamaica operation entirely. After negotiations with the Government, the company agreed to keep the plant operating at one-half of its rated capacity throughout 1983, after which ALPART's future may be dependent on favorable aluminum market indications.

The Caribbean Cement Co. initiated a $90 million expansion program designed to modernize the plant and double its 400,000-ton-per-year capacity. A fuel conversion from oil to coal was part of the modification program. A $57.2 million loan was obtained from the IDB to help finance this project.

Jamaica continued evaluating the potential benefits of converting electric powerplants and industrial boilers from oil to coal. This study has had special emphasis because of Jamaica's complete dependence on imported oil as a source of commercial energy. Petroleum import costs in 1982 were estimated at almost $500 million, about one-half of total export earnings.

The Petroleum Corp. of Jamaica (PETROJAM) ended the first phase of its petroleum exploration program. PETROJAM had drilled three onshore wells at a cost of $16 million without encountering commercial crude oil deposits. An evaluation of the collected data was underway, and additional drilling was not expected until 1984. With a $7 million grant, which Jamaica received from the Canadian Government, seismic work was initiated off the southern, eastern, and western coasts. The Union Texas Petroleum Co. of the United States joint venture with Azienda Generali Italiana Petroli S.p.A. of Italy was unsuccessful with its first offshore well, drilled in the Arawak block in the Pedro Bank. Reportedly, Union's 6-year exploration contract called for a total of six wells.

Concerned about low profit margins, Esso West Indies Ltd. sold its 35,500-barrel-per-day refinery to the Government for $55 million. PETROJAM assumed operation of the refinery in October.

Table 2.—Jamaica: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	6,146	5,371	5,371	
Oxides and hydroxides do	2,437	48	(1)	United Kingdom.[1]
Metal including alloys:				
Scrap	2,585	--		
Semimanufactures	582	429	(1)	Trinidad and Tobago 368; St. Lucia 24; Guyana 22.
Copper: Metal including alloys, scrap	148,055	165	49	West Germany 82; Belgium-Luxembourg 22; Netherlands 12.
Gold: Waste and sweepings value	--	$69,800	--	Canada $69,500; U.S. Virgin Islands $300.
Iron and steel: Metal:				
Scrap	(1)	19	19	
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,005	179	--	Trinidad and Tobago 177; Cayman Islands 2.
Universals, plates, sheets	5,374	3,933	--	Trinidad and Tobago 3,315; Antigua 201; Belize 122.
Rails and accessories	1	--		
Tubes, pipes, fittings	600	532	--	Dominica 132; Trinidad and Tobago 123; St. Lucia 65.
Castings and forgings, rough	8,386	9	9	
Silver:				
Waste and sweepings value	$36,182	$509	--	All to U.S. Virgin Islands.
Metal including alloys, unwrought and partly wrought troy ounces	225	--		
Tin: Metal including alloys:				
Scrap	85,398	444	444	
Semimanufactures	145	86	43	Netherlands 43.
Zinc: Metal including alloys, scrap	19,679	9	9	
NONMETALS				
Clays and clay products:				
Crude	245	--		
Products:				
Nonrefractory value	$1,286	$46,492	$2,900	Turks and Caicos Islands $29,751; Canada $10,976; Cayman Islands $1,659.
Refractory including nonclay brick	24	--		
Gypsum and plaster	78,525	139,496	41,223	Colombia 39,965; Ecuador 16,668; Panama 15,860.
Lime	925	--		
Salt and brine thousand tons	4	1,141	--	Trinidad and Tobago 635; Barbados 325; Haiti 160.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	400	1	--	All to Trinidad and Tobago.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	18	44	--	All to Yugoslavia.
Gravel and crushed rock	36,341	9	--	All to St. Lucia.
Sand other than metal-bearing	6,259	--		
Sulfur: Sulfuric acid	143	30	--	All to Trinidad and Tobago.
Other:				
Crude kilograms	--	26,485	24,042	United Kingdom 2,057; Canada 386.
Slag and dross, not metal-bearing	500	NA	NA	NA.
MINERAL FUELS AND RELATED MATERIALS				
Hydrogen, helium, rare gases	2	106	91	United Kingdom 15.
Petroleum and refinery products:				
Crude 42-gallon barrels	1,408	--		
Refinery products:				
Liquefied petroleum gas do	13	--		
Gasoline: Motor do	34,292	--		
Kerosine and jet fuel do	6,598	4,541	--	NA.
Distillate fuel oil do	24,574	32,870	579	St. Lucia 17,020.
Lubricants do	110,428	111,860	--	Guyana 15,913; Paraguay 15,101; Netherlands Antilles 12,130.
Residual fuel oil do	109,418	1,164	--	Sweden 899; Haiti 264.
Bitumen and other residues do	23,840	17,629	--	Trinidad and Tobago 11,575; Cayman Islands 5,424.

NA Not available.
[1]Less than 1/2 unit.

Table 3.—Jamaica: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	45,268	47	37	United Kingdom 10.
Metal including alloys:				
Scrap	195	--		
Unwrought	839	1,269	1	Canada 1,268.
Semimanufactures	1,274	2,205	796	United Kingdom 355.
Copper:				
Sulfate	2	14	13	Mainly from France.
Metal including alloys:				
Unwrought	1	(1)	(1)	
Semimanufactures	35,943	7,312	59	Hong Kong 6,588; United Kingdom 575.
Gold:				
Waste and sweepings value	--	$992	--	NA.
Metal including alloys, unwrought and partly wrought troy ounces	31,058	323,210	64	United Kingdom 318,613.
Iron and steel: Metal:				
Scrap value	$31,124	--		
Pig iron, cast iron, related materials do	$6,832	$14,927	$14,927	
Ferroalloys	45	86	2	Canada 84.
Steel, primary forms	3,093	8,062	4,849	Brazil 2,937; Australia 264.
Semimanufactures:				
Bars, rods, angles, shapes, sections	3,481	10,369	6,257	United Kingdom 2,805; Belgium-Luxembourg 594.
Universals, plates, sheets	74,589	14,904	1,779	West Germany 5,130; Japan 3,911; United Kingdom 2,227.
Hoop and strip	340	285	170	United Kingdom 95; Mexico 13; Belgium-Luxembourg 5.
Rails and accessories	570	1	--	All from United Kingdom.
Wire	32,164	39,337	598	United Kingdom 36,248; Belgium-Luxembourg 1,213; West Germany 830.
Tubes, pipes, fittings	3,699	3,529	2,161	Japan 930; Canada 340; United Kingdom 77.
Lead:				
Oxides	227	NA	NA	NA.
Metal including alloys:				
Scrap	--	NA	NA	NA.
Unwrought	39	41	1	Canada 20; United Kingdom 20.
Semimanufactures	3,330	76	31	United Kingdom 38; Canada 5.
Manganese: Ore and concentrate	189	353	--	United Kingdom 259; West Germany 54; Belgium-Luxembourg 40.
Molybdenum: Metal including alloys, unwrought kilograms	--	1	1	
Nickel: Metal including alloys:				
Unwrought	--	NA	NA	NA.
Semimanufactures	23	5,005	3	United Kingdom 5,001; Canada 1.
Platinum-group metals: Metal including alloys, unwrought and partly wrought troy ounces	707	9,259	3,633	Canada 4,887; United Kingdom 739.
Silver:				
Ore and concentrate value	$14	NA	NA	NA.
Waste and sweepings do	--	NA	NA	NA.
Metal including alloys, unwrought and partly wrought troy ounces	13,921	41,828	4,983	Canada 9,517.
Tin: Metal including alloys:				
Unwrought	11	(1)	--	NA.
Semimanufactures	6,856	13,138	2,124	United Kingdom 6,434; Netherlands 2,299; West Germany 1,518.
Titanium: Oxides	172	772	174	United Kingdom 271; Mexico 200; West Germany 126.
Tungsten: Metal including alloys, unwrought kilograms	25	--		
Uranium and/or thorium: Metal including alloys, all forms do	--	NA	NA	NA.
Zinc:				
Oxides	4	306	27	Mexico 211; Venezuela 56; Norway 10.
Blue powder	50	31	11	United Kingdom 20.
Metal including alloys:				
Scrap	1,019	--		
Unwrought	458	373	--	All from Canada.
Semimanufactures	32	1	--	Do.
Other:				
Ores and concentrates	2	NA	NA	NA.
Oxides and hydroxides kilograms	1,704	11,510	600	West Germany 5,000; Venezuela 3,600; United Kingdom 1,410.
Ashes and residues	--	NA	NA	NA.

See footnotes at end of table.

Table 3.—Jamaica: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	14	17	17	
Dust and powder of precious and semi-precious stones, value	$492	$5	--	All from United Kingdom.
Grinding and polishing wheels and stones	17	1	(1)	NA.
Asbestos, crude	4	78	23	Canada 51; West Germany 2; United Kingdom 2.
Chalk	20	12	--	West Germany 10; Australia 2.
Clays and clay products:				
Crude	365	1,192	1,114	Mexico 67; Canada 5; Belgium-Luxembourg 4.
Products:				
Nonrefractory, value	$560,332	$1,190,747	$744,194	United Kingdom $159,766.
Refractory including nonclay brick	12,099	3,351	2,823	United Kingdom 294; Canada 177.
Cryolite and chiolite	--	NA	NA	NA.
Diamond:				
Gem, not set or strung, value	$11,162	NA	NA	NA.
Industrial, do	$4,542	$8,348	--	United Kingdom $7,997; Puerto Rico $351.
Diatomite and other infusorial earth	3	262	249	Puerto Rico 13.
Feldspar, fluorspar, related materials	4	6	6	
Fertilizer materials: Manufactured:				
Ammonia	148	242	125	United Kingdom 84; West Germany 33.
Nitrogenous	28,871	31,996	12,514	Dominican Republic 5,972.
Phosphatic	11,760	13,245	3,584	Netherlands 7,811; Dominican Republic 1,850.
Potassic	2,869	13,687	NA	NA.
Graphite, natural	19	1	1	
Gypsum and plaster	39	49	49	
Lime	--	3	3	
Magnesium compounds: Magnesite	13	--		
Mica:				
Crude including splittings and waste	37	73	--	Norway 72; Belgium-Luxembourg 1.
Worked including agglomerated splittings, kilograms	75	320	292	United Kingdom 28.
Nitrates, crude	1,433	2	--	All from West Germany.
Pigments, mineral:				
Natural, crude	(2)	(3)	--	All from United Kingdom.
Iron oxides and hydroxides, processed	68	19	--	United Kingdom 10; West Germany 9.
Precious and semiprecious stones other than diamond, value	$2,007	$59,298	$207	West Germany $43,171; Israel $15,920.
Salt and brine	28,702	41,269	40,465	Canada 796; Barbados 8.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	29	20	17	Sweden 2; Netherlands 1.
Sodium carbonate, natural and manufactured	3,215	4,960	4,736	West Germany 107; East Germany 40; United Kingdom 30.
Sodium hydroxide	404,314	573,628	572,568	United Kingdom 948; West Germany 88; Italy 14.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5	--		
Worked	1,595	2	2	
Gravel and crushed rock	24	53	53	
Limestone other than dimension	--	1,280	--	All from Dominican Republic.
Sand other than metal-bearing	103	369	367	United Kingdom 2.
Sulfur:				
Elemental:				
Crude including native and byproduct	5,516	8,542	37	West Germany 8,500; Belgium-Luxembourg 5.
Colloidal, precipitated, sublimed	5,251	108	1	Venezuela 107.
Dioxide, kilograms	737	8	(1)	Mainly from Netherlands.
Sulfuric acid	2,018	2,164	2,163	United Kingdom.[1]
Talc, steatite, soapstone, pyrophyllite	210	286	214	Norway 71; United Kingdom 1.

See footnotes at end of table.

Table 3.—Jamaica: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Other:				
Crude	4	500	-	All from United Kingdom.
Slag and dross, not metal-bearing	8	NA	NA	NA.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	56	141	82	Canada 36; United Kingdom 23.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	82	41	41	
Carbon: Carbon black	764	837	63	Venezuela 736; Canada 22; West Germany 15.
Coke and semicoke	175	651	626	United Kingdom 15; West Germany 10.
Hydrogen, helium, rare gases	82	19	14	United Kingdom 5.
Peat including briquets and litter value	$404	NA	NA	NA.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	6,775	5,489	154	Venezuela 5,072; Mexico 263.
Refinery products:				
Liquefied petroleum gas do	156	434	7	Venezuela 422; Netherlands Antilles 4.
Gasoline:				
Aviation do	18	18	--	All from Netherlands Antilles.
Motor do	--	321	--	Do.
Mineral jelly and wax do	13	20	7	United Kingdom 9; West Germany 2; Venezuela 2.
Kerosine and jet fuel do	51	213	(1)	Netherlands Antilles 212.
Distillate fuel oil do	64	121	(1)	Mainly from Netherlands Antilles.
Lubricants do	34	48	16	Netherlands Antilles 19; Trinidad and Tobago 12.
Nonlubricating oils do	--	20	(1)	Mainly from Netherlands Antilles.
Residual fuel oil do	7,648	9	(1)	Netherlands Antilles 8; Trinidad and Tobago 1.
Bitumen and other residues do	2	2	1	NA.
Tars and other crude chemicals derived from coal, gas, and petroleum	37	32	31	United Kingdom.[1]

NA Not available.
[1]Less than 1/2 unit.
[2]Unreported quantity valued at $649.
[3]Unreported quantity valued at $1,181.

TRINIDAD AND TOBAGO

In 1982, the economy of Trinidad and Tobago suffered its second downturn since 1973. The country has depended on petroleum exports for about 93% of its foreign currency earnings. A decline in crude oil production and prices coupled with lower production and prices from other economic sectors caused major problems, including budget and balance-of-payments deficits.

The petroleum products, asphalt, and fertilizer facility, which Trinidad and Tobago inaugurated in 1980 as a temporary concessionary financing aid to qualified Caribbean countries, has not been widely used. Given the rather bleak outlook for the petroleum sector and an overall poor economic performance, some analysts observed that Trinidad and Tobago's ability and inclination to continue the facility beyond its authorized life of 3 years was questionable.

The Iron and Steel Co. of Trinidad and Tobago (ISCOTT) experienced technical difficulties that kept production and sales below expectations. In addition, U.S. steelmakers accused ISCOTT of dumping carbon steel wire rod on the U.S market at less than fair value. If an investigation by the U.S. Department of Commerce finds against ISCOTT, the company's exports to the United States could be subject to retroactive duties. In 1981, it was reported that ISCOTT exported about 6,000 tons of rod to the United States, and in the first half of 1982, these exports reached almost 22,000 tons. The U.S. producers claimed ISCOTT's dumping margin was 14%. ISCOTT also faced the problem of storing and shipping the highly explosive direct-reduction sponge iron.

In April, ISCOTT inaugurated its second 420,000-ton-per-year direct-reduction module. At the same time, the first module was

shut down for maintenance. The second module operated only one shaft furnace, and iron output was expected to remain curtailed pending improved market conditions. ISCOTT's electric arc furnaces consumed about 15% of Trinidad and Tobago's total power output.

Construction of Central Trinidad Steel Co.'s new 90,000-ton-per-year section mill was on schedule for a March 1983 startup. Structural sections, produced from steel billets purchased from ISCOTT, were expected to be sold to petroleum companies and to construction industries located in Trinidad and Tobago and elsewhere in the Caribbean.

The National Gas Co. of Trinidad and Tobago expected to start recovering gas from Amoco Trinidad Oil Co. Ltd.'s Poui and Teak Fields by the end of 1982. The fields were located at 10 and 25 miles off Galeota Point. Gas production from the two fields was expected to peak at 100 million cubic feet per day. Amoco Trinidad's 20-slot platform in the Cassia Field, 35 miles southeast of Trinidad, was expected to be inaugurated in January 1983. Future production was estimated at 450 million cubic feet of gas per day, double the 1982 output. The Government was negotiating a $50 million loan to help finance the construction of a 40-mile gas pipeline from Trinidad's east coast to Point Lisas. Line capacity was to be 1 billion cubic feet per day. The total cost of the pipeline was estimated at $140 million.

Crude oil production continued to decline in 1982, and a promising discovery by Amoco Trinidad off Galeota Point was later determined to be noncommercial. Amoco Trinidad's production rate fell 12% in 1982 and was projected to drop an additional 14% in 1983.

In August, it was announced that Tesoro Petroleum Co. proposed to sell the Government its 49.9% interest in the Trinidad-Tesoro Oil Co. Subsequent negotiations regarding price were not successful. Tesoro Petroleum wanted $200 million for its share, but the Government proposed that it would pay only the $50,000 cost of Tesoro Petroleum's original investment in 1969. The Government maintained that Tesoro Petroleum had made no further capital investment in the company but had amassed considerable profit from the operation.

To the consternation of both public and private entities, in August, Texaco Trinidad Inc. (TEXTRIN) announced that it would sell its 275,000-barrel-per-day refinery to the Government. The refinery throughput was declining and had dropped to 45,000 barrels per day in December. TEXTRIN claimed that the refinery was not a viable operation under present purchasing and marketing conditions, and that the company had sustained untenable losses for a period of years. The company proposed to retain its concession areas, which accounted for crude oil production of about 28,000 barrels per day. Negotiations between the Government and TEXTRIN were underway at the end of the year.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Barbadian dollars (BD$) to U.S. dollars at the rate of BD$2.01=US$1.00.

[3]Economic analyses of Cuba by various non-Cuban researchers have resulted in different interpretations of available information. A review of some of these analyses and a general discussion were presented by R. F. Lamberg, "Cuba's Economy in Crisis," Swiss Review of World Affairs, January 1983, pp. 23-27.

[4]Where necessary, values have been converted from Cuban pesos (CP$) to U.S. dollars at the rate of CP$1.25=US$1.00.

[5]Where necessary, values have been converted from Haitian gourdes (HG$) to U.S. dollars at the rate of HG$5.00=US$1.00.

[6]Where necessary, values have been converted from Jamaican dollars (J$) to U.S. dollars at the rate of J$1.78=US$1.00.

Table 4.—Trinidad and Tobago: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	15	NA	NA	NA.
Copper: Metal including alloys, all forms	478	69	29	United Kingdom 36; Barbados 2.
Iron and steel: Metal:				
Scrap	18	56	54	Guyana 2.
Pig iron, cast iron, related materials	18,000	79,316	--	All to Brazil.
Steel, primary forms	(1)	NA	NA	NA.
Semimanufactures	2,041	NA	NA	NA.
Lead:				
Ore and concentrate	20	NA	NA	NA.
Oxides	5	417	52	United Kingdom 236; Mexico 100; West Germany 26.
Metal including alloys, all forms kilograms	913	NA	NA	NA.
Molybdenum: Metal including alloys, all forms	--	NA	NA	NA.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	5,466	NA	NA	NA.
Tin: Metal including alloys, all forms	(2)	504	1	Netherlands 488; United Kingdom 15.
Zinc: Metal including alloys, all forms	2	548	16	Canada 459; Norway 60; United Kingdom 12.
Other: Oxides and hydroxides kilograms	1,527	NA	NA	NA.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones kilograms	53	110	13	Venezuela 45; Brazil 9; India 6.
Asbestos, crude value	$40	$2	$2	
Barite and witherite	1,037	82,882	--	Peru 76,409; Brazil 6,382; West Germany 85.
Cement	120	309,379	24,010	Colombia 245,419; Denmark 18,284; Spain 11,463.
Chalk value	(3)	$18,324	$17,819	United Kingdom $335; Colombia $90; Switzerland $35.
Clays and clay products:				
Crude	72	110,041	91,947	United Kingdom 18,089; Netherlands 4; Canada 1.
Products:				
Nonrefractory	(4)	4,540	133	Dominican Republic 330; Barbados 9; Brazil 7.
Refractory including nonclay brick	NA	234,136	3,390	United Kingdom 124,374; Austria 30,036; West Germany 80.
Diamond: Gem, not set or strung value, thousands	--	$864	$297	Belgium-Luxembourg $294; Canada $128.
Fertilizer materials:				
Crude, unspecified	--	7,811	7,599	West Germany 118; Netherlands 54; Colombia 40.
Manufactured:				
Ammonia	119,147	5,095	--	West Germany 2,882; Belgium-Luxembourg 2,207; United Kingdom 5.
Potassic	17	106,511	600	United Kingdom 101,308; West Germany 2,475; Belgium-Luxembourg 1,700.
Unspecified and mixed	78	NA	NA	NA.
Gypsum and plaster	(5)	8,497	660	Venezuela 7,766; United Kingdom 71.
Lime	(6)	141,795	138,094	United Kingdom 3,701.
Mica:				
Crude including splittings and waste	NA	176	10	United Kingdom 121; Norway 45.
Worked including agglomerated splittings	NA	15	15	
Salt and brine	295	34,817	88	United Kingdom 26,578; Netherlands Antilles 7,011; Jamaica 1,119.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	1	5,194	4,872	Portugal 132; United Kingdom 116; Canada 37.
Sodium hydroxide	31	4,033	3,181	United Kingdom 222; Portugal 132; France 115.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2	42	6	China 36.
Worked	(7)	11	--	Italy 5; United Kingdom 1.
Gravel and crushed rock	7	16,131	262	Dominican Republic 14,998; Italy 270.
Quartz and quartzite value	$343	$4,000	$2,000	Netherlands $1.
Sand other than metal-bearing	9	NA	NA	NA.

See footnotes at end of table.

Table 4. —Trinidad and Tobago: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental: Colloidal, precipitated, sublimed	15,932	5	4	Netherlands 1.
Sulfuric acid	5	521	45	United Kingdom 416; Netherlands 40; Jamaica 30.
Talc, steatite, soapstone, pyrophyllite	3	1,785	1,611	Norway 107; Canada 26; United Kingdom 21.
Other:				
Crude	(8)	4,410	10	Bahamas 4,400.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	2	1,794	1,149	United Kingdom 87; Belgium-Luxembourg 79; Japan 3.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	6,167	NA	NA	NA.
Coal: All grades including briquets		33,662	33,527	West Germany 50; United Kingdom 30; Norway 11.
Hydrogen, helium, rare gases	1	164	158	United Kingdom 5.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	49,601	48,421		Saudi Arabia 37,004; Indonesia 11,291; Norway 90.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	509,735	9,554	8,904	France 84.
Mineral jelly and wax do	766	3,542	464	United Kingdom 1,692; West Germany 811; Japan 472.
Kerosine and jet fuel do	717	NA	NA	NA.
Distillate fuel oil do	11,612	NA	NA	NA.
Lubricants do	767	NA	NA	NA.
Nonlubricating oils do	86	NA	NA	NA.
Residual fuel oil do	45,083	25	25	
Asphalt do	NA	267	260	United Kingdom 7.
Bitumen and other residues do	18	NA	NA	NA.
Bituminous mixtures do	6,508	10,102	9,235	United Kingdom 685; Barbados 30; Jamaica 6.
Tars and other crude chemicals derived from coal, gas, and petroleum	91,090	16	3	United Kingdom 13.

NA Not available.
[1]Excludes quantity valued at $107.
[2]Less than 1/2 unit.
[3]Undisclosed quantity valued at $2,061.
[4]Undisclosed quantity valued at $261,814.
[5]Undisclosed quantity valued at $550.
[6]Undisclosed quantity valued at $441.
[7]Undisclosed quantity valued at $367.
[8]Undisclosed quantity valued at $833.

Table 5.—Trinidad and Tobago: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	182	--	Jamaica 152; Suriname 30.
Oxides and hydroxides	80	72	3	United Kingdom 68.
Metal including alloys, all forms	30,503	8,519	2,423	Sweden 3,314; Canada 1,211; Jamaica 670.
Chromium: Oxides and hydroxides	10	NA	NA	NA.
Copper:				
Sulfate	12	NA	NA	NA.
Metal including alloys, all forms	18,875	617	310	United Kingdom 247; West Germany 19; Japan 16.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	NA	198,997	--	All from Brazil.
Pyrite, roasted	63,255	NA	NA	NA.
Metal:				
Scrap	5	56	54	Guyana 2.
Pig iron, cast iron, related materials	42	15	--	All from United Kingdom.
Steel, primary forms	18,964	10,404	8,131	West Germany 1,195; Belgium-Luxembourg 532.
Semimanufactures:				
Bars, rods, angles, shapes, sections	156,694	60,192	2,174	United Kingdom 38,733; Belgium-Luxembourg 13,599; China 1,500.
Universals, plates, sheets	292,415	19,301	188	United Kingdom 5,912; Japan 2,772; Belgium-Luxembourg 1,238.
Hoop and strip	270	978	13	Canada 802; Japan 157; Belgium-Luxembourg 5.
Rails and accessories	39	(1)	(2)	United Kingdom.[3]
Wire	96,592	14,178	566	United Kingdom 10,690; Japan 1,001; West Germany 723.
Tubes, pipes, fittings	195,404	14,313	5,268	France 6,222; United Kingdom 1,034; Netherlands 37.
Castings and forgings, rough	25	3	--	All from United Kingdom.
Lead:				
Oxides	588	417	52	United Kingdom 236; Mexico 100; West Germany 26.
Metal including alloys, all forms	1,656	(4)	NA	NA.
Magnesium: Metal including alloys, all forms	3	9	8	United Kingdom 1.
Manganese: Ore and concentrate	2	NA	NA	NA.
Nickel: Metal including alloys, all forms	4	1	NA	NA.
Platinum-group metals: Metal including alloys, unwrought and partly wrought troy ounces	4,469	NA	NA	NA.
Silver:				
Waste and sweepings value	$10,021	NA	NA	NA.
Metal including alloys, unwrought and partly wrought troy ounces	39,995	(5)	NA	NA.
Tin: Metal including alloys, all forms	2,084	504	1	Netherlands 488; United Kingdom 15.
Titanium: Oxides	5,884	938	225	United Kingdom 419; West Germany 139; Japan 120.
Tungsten: Metal including alloys, all forms kilograms	342	8	7	West Germany 1.
Zinc:				
Oxides	156	153	10	United Kingdom 71; Belgium-Luxembourg 53; Venezuela 15.
Metal including alloys, all forms	558	548	16	Canada 459; Norway 60; United Kingdom 12.
Other:				
Ores and concentrates value	$68,117	$108,000	$9,000	Jamaica $89,000; Suriname $10,000.
Oxides and hydroxides	286	NA	NA	NA.
Ashes and residues	5	NA	NA	NA.
Pyrophoric alloys kilograms	573	NA	NA	NA.
Base metals including alloys, all forms	35	NA	NA	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2	6	--	Italy 5; West Germany 1.
Dust and powder of precious and semi-precious stones	--	NA	NA	NA.
Grinding and polishing wheels and stones	99	110	13	Venezuela 45; Brazil 9; India 6.
Asbestos, crude	31	2	2	

See footnotes at end of table.

Table 5.—Trinidad and Tobago: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Barite and witherite	31,864	82,882	---	Peru 76,409; Brazil 6,382; West Germany 85.
Boron materials: Crude natural borates value	$151	--		
Cement	232,517	309,379	24,010	Colombia 245,419; Denmark 18,284; Spain 11,462.
Chalk	629	18,324	17,819	United Kingdom 335; Colombia 90; Switzerland 35.
Clays and clay products:				
Crude	2,769	110,236	92,141	United Kingdom 18,090; Netherlands 4.
Products:				
Nonrefractory	2,317	4,540	133	Guyana 2,292; United Kingdom 1,706; Dominican Republic 330.
Refractory including nonclay brick	82,295	234,136	3,390	United Kingdom 124,374; Canada 76,221; Austria 30,036.
Diamond:				
Gem, not set or strung carats	550	(6)	NA	NA.
Industrial do	130,000	(7)	NA	NA.
Diatomite and other infusorial earth	600	--		
Feldspar, fluorspar, related materials	27	2,493	--	Netherlands Antilles 2,482; United Kingdom 11.
Fertilizer materials:				
Crude, unspecified	385	7,811	7,599	West Germany 118; Netherlands 54; Colombia 40.
Manufactured:				
Ammonia	6	NA	NA	NA.
Nitrogenous	(8)	5,095	--	West Germany 2,882; Belgium-Luxembourg 2,207; United Kingdom 5.
Phosphatic	1,237	962	961	United Kingdom 1.
Potassic	6,327	106,511	600	United Kingdom 101,308; West Germany 2,475; Belgium-Luxembourg 1,700.
Unspecified and mixed	617	8,491	7,750	United Kingdom 502; West Germany 236; New Zealand 3.
Graphite, natural value	$353	$6,000	$6,000	
Gypsum and plaster	6,132	8,487	600	Venezuela 7,766; United Kingdom 71.
Lime	7,756	141,795	138,094	United Kingdom 3,701.
Magnesium compounds: Magnesite	3	1	--	All from United Kingdom.
Mica:				
Crude including splittings and waste	NA	176	10	United Kingdom 121; Norway 45.
Worked including agglomerated splittings	NA	15	15	
Pigments, mineral: Iron oxides and hydroxides, processed	122	87	--	West Germany 33; Spain 23; United Kingdom 19.
Precious and semiprecious stones other than diamond:				
Natural carats	930	NA	NA	NA.
Synthetic do	4,531	NA	NA	NA.
Salt and brine	28,694	34,817	88	United Kingdom 26,578; Netherlands Antilles 7,011; Jamaica 1,119.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	38	NA	NA	NA.
Sodium carbonate, natural and manufactured	9,931	5,194	4,872	Portugal 132; United Kingdom 116; Canada 37.
Sodium hydroxide	5,867	4,033	3,181	Canada 236; Portugal 132; France 115.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked value	$2,739	$67,000	$6,000	China $61,000.
Worked	138	11	--	Italy 5; United Kingdom 1.
Dolomite, chiefly refractory-grade value	$183	$316	$316	
Gravel and crushed rock	1,140	16,131	262	Domincan Republic 14,998; Italy 270; China 193.
Limestone other than dimension	13,282	14,110	4	Netherlands Antilles 6,200; Barbados 5,333; Bahamas 2,573.
Quartz and quartzite	119	NA	NA	NA.
Sand other than metal-bearing	309	608	603	United Kingdom 4; Canada 1.

See footnotes at end of table.

Table 5.—Trinidad and Tobago: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental: Colloidal, precipitated, sublimed	3,062	5	4	Netherlands 1.
Dioxide	12	NA	NA	NA.
Sulfuric acid	1,666	534	45	United Kingdom 416; Netherlands 40; Jamaica 30.
Talc, steatite, soapstone, pyrophyllite	619	1,785	1,611	Norway 107; Canada 26; United Kingdom 21.
Other:				
Crude	25	4,410	10	Bahamas 4,400.
Slag and dross, not metal-bearing	1	NA	NA	NA.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	2,219	2,346	1,443	Canada 690.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	161	NA	NA	NA.
Carbon: Carbon black	708	2,228	307	Venezuela 1,061.
Coal: All grades including briquets	732	33,662	33,527	West Germany 50; United Kingdom 30; Norway 11.
Hydrogen, helium, rare gases	41	164	158	United Kingdom 5.
Peat including briquets and litter	42	28	2	Ireland 11; Norway 11; United Kingdom 3.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	50,221	42,857	--	Saudi Arabia 29,633; Indonesia 13,076.
Refinery products:				
Liquefied petroleum gas do	27,782	15,857	940	Venezuela 14,778.
Gasoline 42-gallon barrels	88	31,289	--	All from Netherlands Antilles.
Mineral jelly and wax do	4,620	3,452	464	United Kingdom 1,692; West Germany 811.
Kerosine and jet fuel do	--	NA	NA	NA.
Distillate fuel oil do	--	NA	NA	NA.
Lubricants do	36,818	NA	NA	NA.
Nonlubricating oils do	19,870	NA	NA	NA.
Residual fuel oil do	--	167	167	
Unspecified do	196,089	NA	NA	NA.
Tars and other crude chemicals derived from coal, gas, and petroleum	1,331	51	16	United Kingdom 34.

NA Not available.
[1]Undisclosed quantity valued at $54,000.
[2]Undisclosed quantity valued at $17,000.
[3]Undisclosed quantity valued at $22,000.
[4]Undisclosed quantity valued at $716,000.
[5]Undisclosed quantity valued at $254,000.
[6]Undisclosed quantity valued at $864,000.
[7]Undisclosed quantity valued at $1,000.
[8]Undisclosed quantity valued at $58,452.

The Mineral Industry of Central American Countries

By Doris M. Hyde[1]

CONTENTS

BELIZE

The Government of Belize maintained strict control over spending in 1982 as a means of protecting its import-dependent economy against the effects of a general worldwide recession. The modest economic performance was not expected to differ substantially from the $152 million[2] gross national product (GNP) estimated for 1981. Exports and reexports were expected to decline in 1982, partly as a result of the Mexican peso devaluation. Imports were also expected to decline slightly in 1982, but the overall trade deficit was projected somewhat higher than the $44 million experienced in 1981.

On September 21, 1982, Belize became an independent state. As a result, the new Government became eligible for assistance from international organizations such as the International Monetary Fund, the International Bank for Reconstruction and Development (World Bank), and the United Nations Development Program (UNDP). Belize's independence from its former status as a colony of Great Britain was marred somewhat by the unsettled territorial dispute between Great Britain and Guatemala. Guatemala declared Belize was a part of Guatemala and, therefore, refused to recognize it as an independent state. Negotations between Great Britain and Guatemala continued without resolution.

Mineral resource development in Belize continued to be limited to quantities of limestone, marl, and sand and gravel used in the construction industry. The production of these materials represented only a fraction of the GNP.

An interest in petroleum exploration persisted despite the fact that no deposits considered exploitable have been found. Cities Service Corp. and Occidental Petroleum Corp. were issued a petroleum prospecting license for a total of 1 million acres in the Orange Walk district, near the Mexican and Guatemalan borders. Placid Oil Co. drilled this area in 1981, but the discovery well was not considered commercially viable. Kantana Resources Belize Ltd. was interested in the Cayo district near the Guatemalan border where Anschutz Corp. drilled into noncommercial deposits in 1975.

Technicians from the UNDP as well as the Mexican National Petroleum Institute assisted the Petroleum Office of the Ministry of Natural Resources to monitor onshore and offshore drilling activities.

Table 1.—Central American countries: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
BELIZE					
Stone, sand and gravel:					
Limestone	[r]348,260	[r]364,160	336,900	479,640	356,130
Marl	[r]2,944,560	[r]2,462,100	2,064,300	617,460	503,930
Sand and gravel	[r]733,760	[r]715,100	625,000	589,290	521,030
COSTA RICA					
Cement	490,074	527,893	553,699	694,000	750,200
Clays: Kaolin	530	[r]450	500	450	522
Diatomite	610	590	600	550	470
Gold[e] troy ounces	15,900	16,718	16,000	16,000	27,000
Lime	7,200	9,000	7,500	7,000	9,000
Petroleum refinery products thousand 42-gallon barrels	6,076	6,350	3,781	[e]3,750	3,700
Pumice	1,446	1,260	[e]1,200	[e]1,100	1,500
Salt, marine	34,200	46,000	[e]40,000	[e]39,000	110,200
Silver[e] troy ounces	1,640	2,000	1,600	1,500	2,000
Stone, sand and gravel:					
Crushed rock and rough stone cubic meters	559,500	602,000	[e]600,000	[e]550,000	534,600
Limestone and other calcareous materials	55,100	[e]53,000	[e]55,000	[e]70,000	109,100
Sand and gravel cubic meters	238,900	260,000	[e]250,000	[e]250,000	276,700
EL SALVADOR					
Aluminum metal including alloys, semimanufactures	2,268	2,313	1,587	1,175	1,143
Cement	455,000	582,468	519,892	457,897	417,796
Gold troy ounces	3,619	2,720	2,492	3,883	3,300
Gypsum[e]	7,000	7,000	9,000	6,000	6,000
Iron and steel: Metal:					
Steel, crude[e]	13,600	14,000	14,000	10,000	7,000
Semimanufactures	37,907	27,198	30,959	25,420	19,326
Limestone	750,000	900,000	850,000	810,000	800,000
Petroleum refinery products thousand 42-gallon barrels	[r]5,470	[r]5,229	4,572	4,432	4,002
Salt[e]	27,000	27,000	27,000	25,000	25,000
Silver, fine troy ounces	185,060	151,582	146,202	137,005	85,713
GUATEMALA					
Antimony, mine output, metal content	230	660	556	511	500
Barite	1,330	3,600	4,610	5,200	2,000
Cement	515,079	573,643	568,875	568,012	550,000
Clays:					
Bentonite	2,593	[e]2,700	2,600	[e]2,500	2,500
Other	124,991	131,036	169,861	165,641	160,000
Copper, Cu content of concentrates	2,060	1,768	842	726	700
Feldspar	15,377	10,601	21,530	10,044	12,000
Gypsum, crude:					
For cement manufacture	15,213	18,323	19,310	18,588	17,000
Other	22,559	7,086	13,939	10,134	11,000
Iron ore, gross weight	4,755	2,895	3,500	4,025	4,000
Lead:					
Mine output, metal content[e]	100	100	100	--	--
Metal including secondary	119	90	92	41	40
Lime	44,292	40,575	35,580	24,655	24,500
Nickel, mine output, metal content[2]	1,079	6,199	6,940	--	--
Petroleum and refinery products:					
Crude thousand 42-gallon barrels	[r]221	571	1,513	1,494	[3]2,292
Refinery products do	5,958	[r]5,767	5,381	5,345	[3]4,508
Pumice and related materials:					
Pumice	19,387	18,000	18,000	[e]15,000	15,000
Volcanic ash	35,000	36,581	12,721	5,451	6,000
Salt	10,797	14,493	9,526	13,679	14,000
Silver, mine output, metal content[e] troy ounces	10,000	10,000	10,000	8,000	--
Stone, sand and gravel:					
Limestone thousand tons	825	815	920	920	950
Marble cubic meters	1,171	441	1,353	1,226	1,200
Silica sand	43,370	40,320	69,553	35,582	35,000
Sand and gravel cubic meters	788,605	788,494	604,323	269,844	250,000
Tungsten, mine output, W content of concentrate	--	--	50	42	40
Zinc, mine output, metal content[4]	1,000	[e]1,000	1,000	2,996	3,000
HONDURAS					
Antimony, mine output, metal content	78	46	23	[e]20	--
Cadmium, mine output, metal content	260	204	229	176	85
Cement	271,000	[r]231,000	445,000	[e]225,000	250,000
Copper, Cu content of lead and zinc concentrates	600	1,390	269	454	450
Gold troy ounces	[e]2,500	1,501	2,027	1,579	1,711
Gypsum	[e]22,600	[e]22,600	22,600	20,000	20,000
Iron and steel semimanufactures	25,000	[e]24,000	24,500	20,000	20,000
Lead, mine output, metal content	21,800	16,400	15,171	13,654	13,687

See footnotes at end of table.

Table 1.—Central American countries: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1978	1979	1980	1981[p]	1982[e]
HONDURAS —Continued					
Petroleum refinery products thousand 42-gallon barrels	3,182	3,485	3,648	2,625	685
Salt[e]	32,600	32,600	32,600	30,000	30,000
Silver thousand troy ounces	2,788	2,434	1,766	1,823	1,679
Stone:[e]					
Limestone	500,000	500,000	500,000	450,000	500,000
Marble	43,000	43,000	43,000	40,000	40,000
Zinc ore and concentrate, metal content	24,300	22,000	19,558	19,324	26,875
NICARAGUA[5]					
Cement	199,000	86,158	153,926	100,000	100,000
Copper, mine output, metal content	[e]100	--	--	--	--
Gold, mine output, metal content troy ounces	73,947	61,086	60,000	70,000	[3]51,849
Gypsum and anhydrite, crude[e]	36,000	36,000	40,000	30,000	20,290
Lead ore and concentrate, metal content	400	--	--	--	--
Lime[e]	37,000	36,000	40,000	30,000	30,000
Petroleum refinery products thousand 42-gallon barrels	5,259	3,364	4,087	3,925	4,244
Salt, marine[e]	18,000	18,000	20,000	18,000	18,000
Sand and gravel cubic meters	[e]80,000	[e]80,000	NA	NA	502,812
Silver, mine output troy ounces	482,261	[r]390,406	[3]164,060	[e]150,000	75,551
Zinc ore and concentrate, metal content	3,600	--	--	--	--
PANAMA					
Cement	300,000	510,000	565,000	520,000	349,991
Clays and clay products:					
Crude	183,019	206,892	183,182	99,071	84,261
Products cubic meters	27,160	31,497	40,603	52,010	60,606
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	2,372	2,555	1,974	1,457	1,696
Jet fuel do.	1,146	1,095	1,000	--	--
Kerosine do.	83	--	49	658	725
Distillate fuel oil do.	4,563	4,745	3,000	2,299	2,593
Residual fuel oil do.	7,426	7,300	7,009	5,638	6,389
Liquefied petroleum gas do.	312	--	256	143	148
Asphalt do.	91	730	5	56	67
Unspecified do.	221	NA	NA	157	5
Refinery fuel and losses do.	723	730	[6]356	116	222
Total do.	16,937	17,155	[7]13,649	10,524	11,845
Salt, marine	[r]15,202	[r]17,087	18,583	14,562	[3]11,052
Stone, sand and gravel:					
Limestone[8]	416,363	478,322	536,250	393,722	[3]439,952
Other thousand cubic meters	945	[r]640	[r]731	842	586

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through Aug. 22, 1983.

[2]Ni content of sinter.

[3]Reported figure.

[4]Exports.

[5]In addition to the commodities listed, Nicaragua produced a small but undetermined quantity of cadmium contained in zinc concentrates for export.

[6]Refinery fuel is apparently included as a part of the products listed above; subtraction of the reported detail from the reported total gives a result of -7, indicating a net gain as a result of refining operations, but this cannot allow for refinery fuel.

[7]Detail adds to 7 more than this reported total (see footnote 6).

[8]Excludes approximately 8,000 cubic meters per year, apparently dimension stone.

COSTA RICA

In 1982, the gross domestic product (GDP) was estimated at $3.4 billion,[3] compared with $3.6 billion in 1981. In real terms, the GDP declined by about 6%, the largest single drop since the 1930's. External public debt increased by 17%, and reached almost $3.5 billion. The total private sector external debt was estimated at about $650 million. Inflation averaged about 82% and the official unemployment rate was almost 7%, but the total measured labor force underutilization rate was over 20%.

As part of an economic stabilization program, the Government initiated large price increases for fuels, transportation, and utility rates. Government expenditures were reduced, and revenues were increased through higher direct and indirect taxes. Controls were placed on wage increases and on foreign exchange devaluation.

Exports and imports declined in both volume and value. This reflected shortages of foreign exchange, unfavorable terms of trade, and soft demand within Costa Rica and within the economies of its traditional trading partners. The 1981 trade deficit of $174 million improved to show a $16 million surplus in 1982 but only because the 29% drop in import value exceeded the 15% decrease in exports.

The mineral industry remained of minor importance to the economy. A new mining code was enacted in July that detailed all requirements and restrictions pertaining to securing exploration and mining concessions as applied to foreign and national private individuals or companies and to foreign state-owned enterprises. The code declared all mineral resources to be property of the state, which could grant exploration and exploitation concessions. National or foreign companies may acquire concessions, but foreign state-owned entities must form a joint venture with the Costa Rican Government and be subject to approval by the legislative assembly. The exploitation of hydrocarbons, radioactive minerals, and certain water resources were reserved for the state. Individuals engaged in unmechanized placer mining need not obtain a concession license. The Dirección General de Geología, Minas e Hidrocarburos was given authority to settle conflicting placer claim disputes, maintain a registry of claims, and generally supervise this activity. A new hydrocarbon law was under preparation and was expected to permit foreign companies to search for oil under risk contracts.

Costa Rica was a beneficiary of the Venezuela-Mexico San José Accord for financing crude oil purchases. For the year ending August 2, 1982, Costa Rica purchased 3.8 million barrels of crude oil from the two countries at a cost of about $131 million. About $39 million of the crude oil cost was made available to Costa Rica as low interest loans under the terms of the San José Accord.

In late 1982, Rembrandt Gold Mines sold a 10% interest in its Bella Vista and Montezuma underground gold mines to American Energy Corp. of Canada. The two mines, located on a 2,500-acre concession on the Nicoya Peninsula, were worked intermittently during the last 4 years. American Engery would earn an additional 56% interest after bringing the mines into production and fulfilling other option commitments. Ore vein widths averaged 4 to 6 feet, but some 19-foot wide veins were reported to have been found. Additional exploration work was to be undertaken to verify ore reserve estimates of 78,000 tons proven, 200,000 tons probable, and possible reserves of several million tons. The gold content was reported to average 0.2 to 0.4 troy ounce per ton.

United Hearne Resources Ltd. and Canadian Barranca Corp. planned to expand operations at their jointly owned Santa Clara gold mine, located in Puntarenas Province, 40 miles from San José. Expansion from a reported 350 tons per day of ore milled to 2,000 tons per day was to be accomplished by the installation of a new cyanide carbon-in-pulp mill to treat clays from the Mondongo open pit mine, and also by the construction of additional leaching pads. Ore reserves were estimated at about 5 million tons, averaging 0.05 ounce of gold per ton. Exploration was underway to identify an additional 6 million tons of reserves.

Costa Rican Government officials were concerned about gold smuggling and proposed that a state-owned refinery be constructed. The Government theorized that the availability of such a refinery might encourage increased gold production and reduce the alleged smuggling to Panama.

Several mineral deposits have been under investigation by U.S., Japanese, and other foreign companies. Most of the studies occurred in Guanacaste Province and included copper, nickel, gold, manganese, kaolin, and sulfur.

Private foreign companies have not been permitted to explore for petroleum in Costa Rica, but a change was expected if and when a proposed new hydrocarbon law is enacted. Early in 1982, the Government signed an oil exploration agreement with Petróleos Mexicanos (PEMEX). Plans called for drilling two wells in Limón Province, one in Baja Talamanca in the Uatsi Valley, and the other at Limonal, north of Cahuita. The cost for the two 5,000-meter-plus wells was estimated at about $10 million. Financing was to be provided by loan money available through the petroleum financing facility arrangement between Costa Rica and Mexico.

EL SALVADOR

Negative internal and external forces affected performance in all sectors of El Salvador's economy. The economy suffered from a decline in the production, demand, and price for major commodity exports; strict import controls and a lack of foreign exchange, both of which contributed to shortages of raw materials for manufacturing and company closures; and low private sector confidence, which resulted in reduced investment and the flight of private capital.

The continuation of violent insurgent activity was particularly damaging to economic recovery efforts. There was deliberate destruction of the country's economic infrastructure, including utilities and transportation. These problems were exacerbated by natural flooding. All of these events were costly to repair and caused interruptions in the production and flow of manufactured and agricultural materials for domestic consumption and exportation. Substantial foreign assistance was made available to reinforce El Salvador's own efforts to maintain economic stability.

In real terms, the 1981 GDP represented an economic decline of about 10%, and the continuation of a slowdown that began in 1979. In 1982, a GDP of almost $3.7 billion[4] was expected to show a further downturn in the economy of about 5%. There was no significant change in the fractional contribution by the mining sector to the GDP. The inflation rate for 1982 was estimated at about 15%. During the second year of participation in the Venezuela-Mexico San José Accord, ending August 2, 1982, El Salvador imported 4.5 million barrels of crude oil at a cost of almost $155 million.

Active mining was carried out at the Minas San Cristóbal S.A. gold and silver mines in southern Morazán Department, and the San Sebastián Gold Mines Inc. operations located near Santa Rosa de Lima in western La Unión Department.

The San Cristóbal operation, a wholly owned subsidiary of Javelin International Ltd., was forced to close down in October because of harassment by hostile insurgents and because of an August enforcement of an early 1982 law, which required all gold and silver production to be sold to the Central Reserve Bank. Unfortunately, the bank did not purchase the output from San Cristóbal and the company could not generate cashflow. Some employees were retained to perform maintenance services at the mine and mill, but 300 workers were laid off. When the mine was fully operational, the exported doré earned about $4 million per year in foreign exchange from the production of approximately 3,000 troy ounces of gold and 204,000 troy ounces of silver.

The Commerce Group Corp. of Milwaukee, Wis., acquired a majority 82% ownership of the San Sebastián Mine. Proven reserves at the mine were estimated at over 7 million tons grading 0.1 troy ounce of gold per ton. Potential ore reserves may approximate 50 million tons. The mine had been worked sporadically since 1904.

The San Sebastián ore vein occurs over a 2-square-kilometer area and reportedly has physical characteristics similar to those found at the Pueblo Viejo gold mine in the Dominican Republic. It occurs in a silicified and hydrothermally altered zone of acid volcanics. Gold production was sold domestically. The Commerce Group financed the reopening of the mine, which was last closed in 1978. Like San Cristóbal, mining operations were subject to periodic harassment.

GUATEMALA

Guatemala's three-decade history of sustained economic growth ended in 1982 after a slowdown that began in 1980. In 1982, the GDP, at current prices, reached $9.2 billion,[5] but the real growth rate fell by 3.5%. Throughout the year, Guatemala endured shortages of foreign exchange and recessionary influences caused by a loss of foreign markets for primary exports, fiscal deficits, decreased tourism, reduced foreign private investment, and a reluctance on the part of private commercial banks to provide loans. The balance-of-payments deficit reached about $500 million. The Government initiated corrective measures to tightly control the outflow of foreign exchange and imposed quotas and licensing restrictions on imports.

Interest in Guatemala's future energy potential continued to be optimistic. Total crude oil production remained at about 20% of domestic consumption; nevertheless,

Guatemala continued to export about two-thirds of its crude oil output to the United States. Unexported crude oil was used for national energy needs and was supplemented by locally refined crude oil imports from Venezuela and Mexico and refined product imports.

The possibility of new crude oil discoveries resulting from drilling into extensions of the geological formations shared with Mexico, and the prospect of new petroleum legislation were expected to encourage additional oil exploration investment.

Even though successful petroleum exploration would not provide an immediate relief from energy costs, considerable progress has been made in harnessing Guatemala's geothermal and hydropower potential. The $700 million Rio Chixoy hydroelectic project was scheduled to come onstream in mid-1983, and its full 300-megawatt capacity was expected to be available later that year. The Chixoy project, located about 80 kilometers north of Guatemala City, was expected to result in substantial oil import savings when it brings the nation's total hydroelectric capacity to 850 megawatts. The $1 billion Chulac hydroelectric project was postponed because of economic constraints.

Test drilling in the Zunil geothermal field near Quezaltenango in western Guatemala was reported to have proved the commercial feasibility of a power production of 68 megawatts. Development, however, may be delayed.

Guatemala's 1982 petroleum production rose substantially because of the new Yalpemech Field and secondary recovery efforts in existing fields. Proven crude oil reserves were estimated at 17 million barrels; however, Government officials have projected probable reserves as high as 4 billion barrels.

Present petroleum legislation, considered restrictive, has reportedly been a factor constraining exploration efforts by those foreign companies holding contracts. Among other things, the new petroleum legislation was to create a state oil company, Petróleos de Guatemala, with rather broad authority to regulate the oil industry, including programs and accounting procedures. The Government was consulting with the private petroleum companies to assure that whenever possible the new law would modify objectionable parts of existing legislation.

Basic Resources International S.A. (BRISA) sold 33% of its 57% interest in the central Guatemala Block I concession to Hispánica de Petróleos S.A. (HISPANOIL). It was reported that BRISA planned to sell its remaining 24% interest to Générale Occidental S.A., a major shareholder of BRISA. BRISA reportedly had accounting disagreements with Société Nationale Elf Aquitaine, its partner in Block I.

Texaco Exploration Guatemala Inc. encountered oil in the No. 1 Xan well drilled in 1981 on its Block D concession, located in the northwestern corner of Guatemala next to the Mexican border. In tests, the well pumped 2,300 barrels per day of low-gravity oil from a pay zone below 6,500 feet. Two additional wells drilled in Block D during 1982 were abandoned as dry holes. Texaco planned to study information from a total of four drilled wells before making additional plans.

Texaco joined HISPANOIL and Petrobras International S.A. (BRASPETRO) to explore Block L, a 490,280-acre concession in northern Guatemala. The venture is located to the south of Block D, the Texaco-Amoco Guatemala Petroleum Co. joint venture, and Block E, contracted to HISPANOIL, BRASPETRO, and Elf Aquitaine. The Texaco-HISPANOIL-BRASPETRO Group planned to drill three wells in Block L during the initial 3-year exploration period. Geophysical surveys were expected to last 1 year.

HISPANOIL brought its one-well Yalpemech Field into production early in 1982 for a 5-month test period. After testing, the well was to be reconditioned. The field is located in area AA, a joint venture of HISPANOIL, Elf Aquitaine, and BRASPETRO.

Table 2.—Guatemala: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	205	74	35	Belgium-Luxembourg 37; Netherlands 2.
Semimanufactures	12	623	155	El Salvador 252; Honduras 143; Netherlands 18.
Copper: Metal including alloys:				
Unwrought	58	31	12	West Germany 18.
Semimanufactures	180	68	12	El Salvador 55.
Iron and steel:				
Iron ore and concentrate	8,430	5,304	--	Honduras 3,091; El Salvador 2,213.
Metal:				
Scrap	63	104	--	El Salvador 103.
Pig iron, cast iron, related materials	NA	--		
Steel, primary forms	(1)	484	--	El Salvador 459; Honduras 25.
Semimanufactures:				
Bars, rods, angles, shapes, sections	1	6,292	--	El Salvador 5,018; Honduras 789; Nicaragua 283.
Universals, plates, sheets	NA	4,028	--	El Salvador 1,587; Nicaragua 1,423.
Hoop and strip	NA	30	--	Honduras 20; El Salvador 10.
Wire	NA	1,091	--	El Salvador 1,064; Costa Rica 11; Honduras 11.
Tubes, pipes, fittings	NA	6,959	--	El Salvador 4,184; Honduras 2,373; Nicaragua 229.
Castings and forgings, rough	NA	11	--	All to El Salvador.
Lead: Metal including alloys:				
Unwrought	(1)	42	40	El Salvador 2.
Semimanufactures	2	54	21	El Salvador 31; Honduras 2.
Nickel: Metal including alloys, all forms	13,402	NA		
Tin: Metal including alloys, all forms	(1)	6	--	Nicaragua 5; El Salvador 1.
Zinc: Metal including alloys, unwrought	373	350	108	West Germany 184; Spain 58.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	NA	116	--	All to El Salvador.
Grinding and polishing wheels and stones	133	47	--	Honduras 36; El Salvador 7; Nicaragua 4.
Cement	3,190	5,184	--	Mexico 5,138; Panama 26; Honduras 19.
Clays and clay products:				
Crude	NA	9,854	--	El Salvador 3,891; Honduras 2,908; Venezuela 2,750.
Products:				
Nonrefractory	NA	644	--	El Salvador 430; Honduras 110; Costa Rica 67.
Refractory including nonclay brick	32	537	260	El Salvador 103; Nicaragua 49; Honduras 40.
Fertilizer materials: Manufactured:				
Nitrogenous	27,708	56,236	--	Mexico 56,023; Honduras 52; Belize 47.
Unspecified and mixed	3	2,365	--	Honduras 2,327; El Salvador 38.
Gypsum and plaster	NA	13,999	--	El Salvador 13,367; Costa Rica 592; Honduras 21.
Lime	705	592	--	El Salvador 585; Panama 2.
Pigments, mineral: Natural, crude	NA	216	--	All to El Salvador.
Sodium and potassium compounds, n.e.s.:				
Sodium hydroxide	NA	11	--	All to Panama.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	NA	--		
Worked	1,125	2,311	--	Mexico 1,400; El Salvador 687.
Gravel and crushed rock	NA	24,877	--	Mexico 21,915; Costa Rica 1,962; El Salvador 941.
Quartz and quartzite	NA	340	95	Japan 122; West Germany 73; Netherlands 29.
Sulfur: Sulfuric acid	NA	118	--	Mexico 110; Panama 8.
Talc, steatite, soapstone, pyrophyllite	NA	81	--	El Salvador 47; Nicaragua 20; Honduras 9.
Other:				
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	707	60	--	Mexico 36; Honduras 10; Panama 10.

See footnotes at end of table.

Table 2.—Guatemala: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Lubricants-----42-gallon barrels--	NA	833	--	Honduras 448; El Salvador 294; Costa Rica 56.
Unspecified ----------do----	NA	252	--	All to El Salvador.

NA Not available.
[1]Less than 1/2 unit.

Table 3.—Guatemala: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought ----------	422	428	177	France 251.
Semimanufactures----------	1,424	1,903	277	El Salvador 588; Costa Rica 284; West Germany 176.
Copper: Metal including alloys:				
Unwrought ----------	159	174	170	Republic of South Africa 4.
Semimanufactures----------	522	251	116	Mexico 56; Belgium-Luxembourg 30; Sweden 12.
Iron and steel:				
Iron ore and concentrate --------	NA	2	2	
Metal:				
Scrap ----------	190	725	14	Nicaragua 642; El Salvador 52; Jamaica 10.
Pig iron, cast iron, related materials ----------	NA	26	1	Italy 24; France 1.
Steel, primary forms --------	(1)	24,083	17,676	West Germany 3,099; United Kingdom 683; Belgium-Luxembourg 219.
Semimanufactures:				
Bars, rods, angles, shapes, sections ----------	12	19,084	2,986	West Germany 3,197; Belgium-Luxembourg 3,137; Japan 2,056.
Universals, plates, sheets --	NA	65,296	9,864	Japan 16,609; France 15,351; Belgium-Luxembourg 9,031.
Hoop and strip ----------	NA	1,540	205	Belgium-Luxembourg 421; West Germany 415; Japan 325.
Rails and accessories -----	NA	136	1	West Germany 134.
Wire ----------	NA	21,848	1,478	Australia 7,057; France 3,067; West Germany 1,853.
Tubes, pipes, fittings -----	NA	3,886	1,708	Japan 729; West Germany 396; United Kingdom 312.
Lead: Metal including alloys:				
Unwrought ----------	9	13	3	El Salvador 5; Peru 5.
Semimanufactures----------	65	103	9	El Salvador 47; Peru 30; West Germany 9.
Nickel: Metal including alloys, all forms-	7	60	1	Canada 53; West Germany 2; Norway 2.
Silver: Metal including alloys, unwrought and partly wrought value, thousands--	NA	$10	$8	West Germany $1.
Tin: Metal including alloys:				
Unwrought ----------	25	17	3	United Kingdom 8; West Germany 3; Belgium-Luxembourg 2.
Semimanufactures----------	32	19	8	Netherlands 3; Portugal 2; United Kingdom 2.
Zinc: Metal including alloys:				
Unwrought ----------	4,995	4,198	--	Mexico 2,098; Canada 2,004; Peru 96.
Semimanufactures----------	13	8	4	Mexico 2; Peru 1.
Other:				
Ores and concentrates----------	NA	2,504		
Base metals including alloys, all forms	NA	36	7	Belgium-Luxembourg 11; France 9; United Kingdom 3.

See footnotes at end of table.

Table 3.—Guatemala: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	NA	56	10	West Germany 46.
Grinding and polishing wheels and stones	146	109	22	Austria 32; Brazil 13; West Germany 13.
Asbestos, crude	NA	1,257	150	Canada 1,101; Italy 6.
Boron materials: Oxides and acids	NA	7	6	France 1.
Cement	94,488	61,193	5,435	El Salvador 52,491; West Germany 1,312; Belgium-Luxembourg 1,137.
Clays and clay products:				
Crude	NA	4,708	3,956	United Kingdom 429; Mexico 181; Costa Rica 51.
Products:				
Nonrefractory	NA	700	17	Spain 235; United Kingdom 115; Italy 84.
Refractory including nonclay brick	5,322	4,444	2,606	Mexico 1,358; Canada 235; United Kingdom 84.
Diatomite and other infusorial earth	NA	919	186	Mexico 733.
Graphite, natural	NA	71	13	Mexico 55; Austria 1; Italy 1.
Gypsum and plaster	NA	74	74	
Lime	692	207	87	Mexico 100; Canada 12.
Mica:				
Crude including splittings and waste	NA	10	1	France 9.
Worked including agglomerated splittings	(1)	(1)	NA	NA.
Precious and semiprecious stones other than diamond value, thousands	NA	$9	$1	Switzerland $5; Austria $2.
Salt and brine	NA	25,881	108	Brazil 5,969; Honduras 4,564; Nicaragua 2,769.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	NA	16,573	12,407	Bulgaria 2,617; France 884; West Germany 379.
Sodium hydroxide	NA	13,118	6,714	Nicaragua 3,956; United Kingdom 993; Belgium-Luxembourg 484.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	NA	63	--	All from Mexico.
Worked	4	29	--	El Salvador 18; Mexico 11.
Gravel and crushed rock	NA	76	17	El Salvador 34; Mexico 25.
Quartz and quartzite	NA	192	192	
Sulfur:				
Elemental	NA	416	67	Mexico 258; West Germany 55; Belgium-Luxembourg 36.
Sulfuric acid	NA	965	71	Costa Rica 635; Mexico 177; El Salvador 55.
Talc, steatite, soapstone, pyrophyllite	NA	425	355	China 42; Mexico 12; West Germany 4.
Other:				
Crude	NA	39	--	All from El Salvador.
Building materials of asphalt, asbestos and fiber cements, unfired nonmaterials	11,270	9,228	4,513	El Salvador 4,325.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	NA	12	12	
Coke and semicoke	NA	3,011	2,968	Mexico 43.
Hydrogen, helium, rare gases	NA	6,874	4,433	Mexico 1,761; Nicaragua 365; West Germany 135.
Petroleum and refinery products:				
Crude—42-gallon barrels	NA	2,891	--	Venezuela 2,392; Trinidad and Tobago 499.
Refinery products:				
Liquefied petroleum gas do	NA			
Gasoline, motor do	NA	1,066	(1)	Netherlands Antilles 1,013; Trinidad and Tobago 44.
Mineral jelly and wax do	NA	64	27	West Germany 17; Brazil 12.
Kerosine and jet fuel do	NA	359	41	Netherlands Antilles 184; Bahamas 10.

See footnotes at end of table.

Table 3.—Guatemala: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Distillate fuel oil 42-gallon barrels	NA	3,157	(1)	Trinidad and Tobago 1,162; Netherlands Antilles 960; Bahamas 700.
Lubricants do	NA	104	48	El Salvador 21; Nicaragua 18; Netherlands Antilles 13.
Unspecified do	NA	80	(1)	El Salvador 66; Netherlands Antilles 11.
Tars and other crude chemicals derived from coal, gas, and petroleum	1,901	9,071	7,424	Netherlands Antilles 698; Nicaragua 516; United Kingdom 146.

NA Not available.
[1]Less than 1/2 unit.

HONDURAS

The Honduran economy continued a downturn begun in 1980, and the 1982 GDP of $2.8 billion[6] represented a decline of 1.1% in real terms. Civil unrest in neighboring countries caused disruptions in normal trade patterns, and when combined with other international recessionary factors resulted in deteriorated terms of trade for traditional Honduran exports. Both export and import levels declined, and the estimated trade deficit of $242 million was 26% less than in 1981.

The Government imposed austere economic measures to reduce the budget deficit, to curb foreign exchange losses, and to tighten domestic credit availability. Both public and private capital investments declined. This, combined with foreign exchange shortages and high interest rates, led to production declines in the manufacturing sector and a number of business closures. By the end of 1982, the unemployment level may have reached 40%. The average rate of inflation was estimated at less than 10%, only a fraction higher than for 1981.

The mining industry contributed about 3% to the GDP for the most part, owing to the operation of the polymetallic El Mochito Mine of Rosario Resources Corp., a subsidiary of AMAX Inc. In mid-1982, a 2-year mine expansion project was completed that increased ore-processing capacity from 1,135 to 2,270 tons per day. However, low international metal prices and high costs threatened the viability of continued mine operation. Closure was avoided by an agreement reached with the local labor union to reduce the work force from 1,500 to about 1,200 and a 1982 revision to the Honduran mining code that provided for reduced royalty and tax commitments.

Under the revised code, new mines pay a royalty of only 2% during the first 5 years of operation. Established mines pay royalties of 5% on annual sales when sales are greater than $1.5 million and 3% when sales are less than that amount. Previously, royalties were assessed on a sliding scale that ranged from 5% to 20% with no specific limit placed on a company's total tax liabilities. The new code, however, limits the total tax liability—royalties, income, and export taxes combined—to 55% of taxable income. This was thought to be a significant factor because it set a mining company's total tax liability at a predictable level. Other favorable features were the inclusion of taxes on the distribution of profits, which encompasses repatriation of dividends within the 55% tax ceiling, and a liberalized definition of sales as the gross value of the metals less production and shipping costs. Any amount collected over the 55% tax limit constitutes a tax credit that may be applied toward royalties due in subsequent years.

Petroleum exploration efforts continued to be unsuccessful. Texaco Inc. and Amerada Hess Corp. abandoned their joint on-

shore exploration program in the Olancho Department after completing a third dry hole.

Petróleos Yojoa S.A. and Compañía Exploradora S.A., both Honduran companies, farmed out over 174,000 acres in west-central Honduras to North American Energy Resources Inc. North American planned to initiate a four-well drilling program. The company expected to penetrate the Cretaceous Atima Formation at a depth of less than 6,000 feet. North American sought partners in the venture. The Honduran companies retained a 15% overriding royalty after payout, and the Government retained a 12.5% royalty in the property.

Other companies holding exploration leases included Welsh Energía y Petróleo S.A. and Anschutz de Honduras S.A. Bids for exploration leases were submitted by Aracca Petroleum Corp. and Compañía Petrolera S.A.

After a 12-month shutdown, Texaco Inc. reinitiated operations at its Puerto Cortés crude oil refinery. The opening followed a September 10 agreement between Texaco Inc. and the Government that set forth operating rules for purchasing, shipping, and refining crude oil obtained by the Government from Mexico and Venezuela under the San José Accord financing mechanism.

NICARAGUA

Nicaragua's efforts to sustain the economic growth attained during 1980 and 1981 were unsuccessful. In 1982, the economy suffered from the combined effects of depressed regional and international demand and prices for Nicaraguan exports, a $2.5 billion[7] public debt, declining levels of additional external financial assistance, and almost no new private capital investment. Adding to the economic problems were a series of natural disasters that devastated agriculture and transportation routes by floods followed by drought. As a result of these adverse influences, principally declining terms of trade and natural disasters, the $2.6 billion GDP and 9% real growth rate achieved in 1981 were expected to decline by about 3% in 1982. Unemployment and the rate of inflation were also expected to show a deteriorated position relative to 1981.

Nicaragua concluded several agreements for technical assistance, including hydraulic power engineering, mining, and petroleum exploration. The countries providing assistance included the U.S.S.R., the Netherlands, Bulgaria, Brazil, and Libya. For a second year, Nicaragua was a beneficiary of the Venezuela-Mexico San José Accord. In the year ending August 2, 1982, Nicaragua imported a total of 4.7 million barrels of crude oil valued at over $164 million, of which $49 million was financed under the terms of the San José Accord.

Nicaragua and Neptune Mining Co. came closer to resolving the problem of compensation for the Government's 1979 nationalization of Neptune's gold and silver properties. Neptune was about 52% owned by ASARCO Incorporated. About 36% of the remaining interest in Neptune was owned by Rosario Resources. Nicaragua agreed to pay Neptune $3.7 million plus interest over a 6-year period for doré confiscated at the time of nationalization. In addition, both parties agreed to submit to international arbitration certain tax and accounting questions related to Neptune's claim for compensation. By some accounts, the properties were valued at as much as $56 million, although lesser values have also been suggested. In addition to the precious metals, the Neptune properties produced quantities of lead, zinc, and copper from sulfide ores.

Discussions were held in 1982 with Rosario Resources regarding compensation for the 1979 nationalization of its La Rosita and Siuna gold and silver properties.

The Ministry of Finance announced that a new foreign investment law was in preparation that would encourage new investment in Nicaragua. Details were not made available, but the announcement indicated that foreign investors would be allowed to own 100% of any companies they established in the country and would be permitted to repatriate profits, probably through a combination of the official exchange rate and the parallel market rate. Prior to nationalization of the mineral and petroleum sectors, exploration efforts in Nicaragua were rather limited in scope. The extent to which these two nationalized sectors might be reopened to investment opportunities if the proposed law is enacted was not clear.

Nicaragua planned to invest $12 million in credits advanced by Bulgaria and Sweden for mining and exploration studies. A Bulgarian firm was appointed to study the El

Vesubio gold mine located on the Atlantic coast. El Vesubio was formerly operated by Neptune, which had experienced caving problems in the mine. Bulgaria was to provide $10 million to study and reactivate the mine.

Sweden was reported to be providing $2 million to finance studies at the recently closed La Rosita Mine, as well as mines at El Limón near León; La Libertad near Chalontes, Chontales Department; and El Topacio in southern Zelaya Department. A feasibility study on the El Topacio Mine was to start early in 1983 by the Brazilian state-owned Cía. de Pequisa de Recursos Minerais. Nicaragua also received $400,000 from the World Bank towards reactivating the El Topacio Mine.

The La Rosita gold mine in northeastern Nicaragua, Department of Zelaya, was closed in 1982. This was formerly a property of Rosario Resources. In 1978, Rosario Resources had determined that the mine did not represent a long-term economic operation, and had begun rehabilitation of the Siuna Mine, located about 45 miles from La Rosita. A U.S. consulting firm, Ernest K. Lehmann & Associates Inc., began exploration studies directed toward a possible reopening of the La Rosita Mine. Lehmann was also involved in exploration studies in other areas of Nicaragua.

The Nicaraguan state-owned oil company, Petróleo Nicaragua (PETRONIC) and the overseas subsidiary of Brazil's Petróleo Brasileiro S.A. (PETROBRAS) signed a petroleum exploration agreement. The agreement was similar to contracts PETROBRAS has entered into for other foreign exploration ventures. If a commercial deposit is found, one-quarter of the output would be used to cover PETROBRAS expenses. PETROBRAS would receive no compensation for unsuccessful exploration; however, Nicaragua exempted the company from taxes during the exploration period.

Brazil has become involved in other phases of Nicaragua's energy development. In 1981, a Brazilian technical mission worked with the Instituto Nicaraguense de Energía to formulate a new energy plan for Nicaragua. Under this plan Nicaragua would substitute other energy sources, such as wood, charcoal, and alcohol, for 60% of its gasoline consumption, 15% of its diesel, and 70% of its fuel oil requirements. Brazil was to lend technical assistance in establishing the energy substitution and conservation programs, as well as in the development of hydropower.

PANAMA

Panama's economic growth continued to decelerate. The GDP of $4.2 billion[8] was 1% higher in real terms than that of 1981. The economy has traditionally been dependent on the service industries, activities at the Colon free trade zone, and agricultural exports. Mining and quarrying have never represented more than a fractional percentage of the GDP.

The generally depressed economies prevalent in Latin America, as well as civil unrest in some Central American countries, severely curtailed Panama's normal commercial activities and lowered revenues derived from tourism. Servicing the public external debt, estimated to have reached $2.8 billion in 1982, has become burdensome. About 50% of this debt falls due within the next 5 years.

Two mineral-related industrial developments received attention in 1982. A U.S. company, Ebasco Services Inc., announced it would initiate a feasibility study on the establishment of a coal gasification and methanol complex in Chiriquí Grande. Ebasco received $500,000 from the U.S. Trade and Development Program to organize investors interested in funding the $10 million planning study. The completed complex was expected to cost $4.5 billion. The facility would gasify about 20 million tons of imported coal annually to produce methanol for export to the Far East. Ecologists protested the complex would pollute waters of the Chiriquí Lagoon and cause other environmental damage.

The other mineral-related project involved the construction of a port for transshipping coal coming from the U.S. east or gulf coasts and destined for Japan and other Pacific coast consumers. A 1982 study by Brown and Root Inc. concluded that such a project was viable and would result in a $6 per ton savings on a delivered cost basis at 1982 prices. The Government was evaluating the Brown and Root assessment.

The transisthmus crude oil pipeline of Petroterminal de Panamá S.A. opened on schedule in October, saving both time and money in moving Alaskan crude oil to U.S. east and gulf coast refineries. To compensate for the loss of an estimated $5 million

per month in Panama Canal revenue, because of the pipeline operation, toll charges on the canal were expected to increase by almost 10%.

In September, Rio Tinto Zinc Corp. Ltd. and its majority partner in the Cerro Colorado copper project, state-owned Corporación de Desarrollo Minero Cerro Colorado, decided against continuing the project feasibility study. This decision was not unexpected and was based on existing world economic conditions and the depressed international copper market. The companies planned to periodically review the project for viability.

An interest in the Sossa Petroleum Corp. onshore and offshore petroleum exploration concessions around the Gulf of San Miguel was equally acquired by Aracca Petroleum Corp. and Oxoco-International Inc. Sossa retained a 12.5% interest in the prospect. The group planned to undertake a seismic survey of the area.

[1]Physical scientist, Division of Foreign Data.
[2]Where necessary, values have been converted from Belizean dollars (Bz$) to U.S. dollars at the rate of Bz$2.00=US$1.00.
[3]Where necessary, values have been converted from Costa Rican colónes (¢) to U.S. dollars at the rate of ¢37.58=US$1.00.
[4]Where necessary, values have been converted from El Salvadorian colónes (¢) to U.S. dollars at the rate of ¢2.50=US$1.00.
[5]Where necessary, values have been converted from Guatemalan quetzals (Q) to U.S. dollars at the rate of Q1.00=US$1.00.
[6]Where necessary, values have been converted from Honduran lempiras (L) to U.S. dollars at the rate of L2.00=US$1.00.
[7]Where necessary, values have been converted from Nicaraguan córdobas (C$) to U.S. dollars at the rate of C$10.05=US$1.00.
[8]Where necessary, values have been converted from Panamanian balboas (B) to U.S. dollars at the rate of B1.00=US$1.00.

Table 4.—Panama: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
Aluminum: Metal including alloys, all forms	489	256	112	Costa Rica 114; Belgium-Luxembourg 23.
Cement	1,996	630	--	All to Costa Rica.
Clays and clay products	20	NA		
Copper: Metal including alloys, all forms	NA	20	20	
Iron and steel: Metal:				
Scrap	115	3,272	2,905	Colombia 363.
Steel, primary forms	283	24	--	All to Costa Rica.
Semimanufactures:				
Bars, rods, angles, shapes, sections	4	80	--	All to Nicaragua.
Universals, plates, sheets	7	NA		
Lead: Metal including alloys, all forms	428	410	390	Guatemala 20.
Other: Base metals including alloys, all forms	1,143	1,946	1,799	Republic of Korea 40; West Germany 32; Colombia 25.

NA Not available.

Table 5.—Panama: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	2,631	2,265	1,051	Costa Rica 509; France 317; El Salvador 98.
Copper: Metal including alloys, all forms	603	649	180	Chile 306; Mexico 119; Costa Rica 27.
Iron and steel: Metal:				
Scrap	468	21	NA	NA.
Pig iron, cast iron, related materials	22,978	21,393	9,617	Canada 3,000; United Kingdom 2,997; Netherlands 2,989.
Ferroalloys	33	55	--	All from China.
Steel, primary forms	5,131	13,198	2,580	France 6,609; Costa Rica 1,271; Italy 588.

See footnotes at end of table.

Table 5.—Panama: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	13,315	11,760	1,551	Republic of Korea 4,158; Belgium-Luxembourg 2,158; Japan 959.
Universals, plates, sheets	35,888	29,579	7,777	Japan 7,639; France 2,755; West Germany 2,210.
Hoop and strip	1,178	1,374	40	Japan 1,075; Republic of Korea 34; Netherlands 6.
Rails and accessories	666	192	155	Italy 37.
Wire	6,591	6,759	335	Republic of Korea 2,400; Belgium-Luxembourg 1,026; West Germany 955.
Tubes, pipes, fittings	5,131	13,198	2,580	France 6,609; Costa Rica 1,271; Italy 588.
Castings and forgings, rough	32	54	53	Costa Rica 1.
Lead: Metal including alloys, all forms	54	195	136	Costa Rica 35; Denmark 13; El Salvador 10.
Nickel: Metal including alloys, all forms	2	(1)		
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$62	$79	$63	France $14; West Germany $1.
Tin: Metal including alloys, all forms	4	8	2	Denmark 2; Bolivia 1; Brazil 1.
Zinc: Metal including alloys, all forms	340	407	17	Peru 239; Canada 130; United Kingdom 7.
Other: Base metals including alloys, all forms	38	33	32	
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	34	79	14	Italy 42; Brazil 11; Mexico 2.
Asbestos, crude	283	255	16	Canada 239.
Cement	5,090	4,809	16	Colombia 3,472; Denmark 505; West Germany 257.
Clays and clay products:				
Crude	1,031	799	478	El Salvador 315; West Germany 6.
Products:				
Nonrefractory	779	1,423	55	Nicaragua 305; Costa Rica 304; Italy 254.
Refractory including nonclay brick	532	656	392	West Germany 200; Peru 43; Costa Rica 18.
Diamond: Industrial value, thousands	$10	NA		
Diatomite and other infusorial earth	380	439	113	Mexico 326.
Feldspar, fluorspar, related materials	1,583	1,034	36	Guatemala 974; Belgium-Luxembourg 23.
Fertilizer materials: Manufactured:				
Nitrogenous	36,386	23,940	9,315	West Germany 11,298; Costa Rica 3,252; Guatemala 56.
Phosphatic	4,819	6,724	6,703	Costa Rica 10; West Germany 10.
Potassic	4,976	1,480	1,478	West Germany 2.
Unspecified and mixed	22,275	42,676	16,923	Costa Rica 13,248; West Germany 11,262; Netherlands 1,198.
Gypsum and plaster	18,196	9,284	191	Dominican Republic 9,048; West Germany 4.
Halogens	NA	1	NA	NA.
Lime	1,760	1,555	465	Cuba 477.
Mica: Crude including splittings and waste	9	32	32	
Pigments, mineral: Natural, crude	51	37	17	Mexico 20.
Precious and semiprecious stones other than diamond value, thousands	$186	$276	$57	United Kingdom $88; Uruguay $31; West Germany $23.
Salt and brine	2,389	6,949	367	Netherlands Antilles 5,032; Peru 1,400; United Kingdom 84.
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	2,625	2,882	2,437	West Germany 185; France 120; United Kingdom 100.
Sodium hydroxide	2,579	2,155	1,608	United Kingdom 203; France 127; Belgium-Luxembourg 92.
Stone, sand and gravel:				
Dimension stone, crude	666	833	18	Italy 380; Canada 244; Netherlands 33.
Limestone other than dimension	NA	3,654	245	Costa Rica 3,165; Canada 184.

See footnotes at end of table.

Table 5.—Panama: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Quartz and quartzite	1,515	29	29	
Sand other than metal-bearing	8,828	6,710	6,491	United Kingdom 200; Colombia 8.
Sulfur: Elemental:				
Crude including native and byproduct	NA	5	--	All from West Germany.
Colloidal, precipitated, sublimed	15	45	7	Nicaragua 33; Italy 3.
Talc, steatite, soapstone, pyrophyllite	554	551	442	China 60; Hong Kong 27; Colombia 20.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	105	180	175	Netherlands 4; Costa Rica 1.
Coke and semicoke	63	143	143	
Petroleum and refinery products:				
Crude—42-gallon barrels	13,435	10,444	4	Venezuela 3,584; Mexico 2,887; Netherlands Antilles 29.
Refinery products:				
Gasoline: Motor—do	171	1,240	(2)	Trinidad and Tobago 1,183; United Kingdom 4.
Mineral jelly and wax—do	15	11	3	Japan 4; China 1; West Germany 1.
Kerosine and jet fuel—do	52	7	4	Netherlands Antilles 3.
Distillate fuel oil—do	(2)	NA		
Lubricants—do	67	55	35	Nicaragua 10; Netherlands Antilles 9.
Residual fuel oil—do	103	8	(2)	Netherlands Antilles 5.
Unspecified—do	50	4	3	Mexico 1.

NA Not available.
[1]Undisclosed quantity valued at $3,000; principal sources are the United States $2,000 and West Germany $1,000.
[2]Less than 1/2 unit.

The Mineral Industry of Other Areas of the Far East and South Asia

By E. Chin, Charles L. Kimbell, Gordon L. Kinney, and John C. Wu

CONTENTS

BANGLADESH[1]

The production of crude mineral commodities in Bangladesh was limited to natural gas, a small amount of construction materials, and clay for ceramics and bricks. No metallic minerals were mined.

The only mineral commodity of economic significance was natural gas. Natural gas production has been climbing steadily and becoming an increasingly important source of energy for the country. Proved gas reserves were over 4.5 trillion cubic feet, but the amount has been increasing as exploration discovers large new deposits. Some sources quote reserves at over 10 trillion cubic feet.

Even though production of gas has been increasing, the ratio of gas consumed to recoverable reserves remained one of the lowest in the world. Yearly production was about 0.01% of proved reserves whereas that figure averages about 3% for the rest of the world. This underutilization of a valuable natural resource was mainly because of a limited number of industrial and commercial establishments that can use the gas, a lack of capital to develop the fields, and costly transmission network needed for efficient utilization.

The Bangladesh economy had problems during 1982 because of the international recession, adverse domestic factors, a volatile exchange rate, and high world interest rates. Gross domestic product (GDP) increased by only 0.9% in real terms in fiscal year 1981[2] compared with 6.1% in fiscal year 1980. Production in the industrial sector increased by 2.9% compared with 8.8% a year ago.

On the trade scene both exports and imports failed to meet the targets for the year. Total exports were $615 million[3] while merchandise imports rose to $2.45 billion in fiscal year 1981. The $1.83 billion deficit was one of the worst of the decade. Virtually none of the exports involved minerals or mineral-based commodities. Mineral imports, however, were very important. Crude oil and refined petroleum products were more than 80% of export earnings in fiscal year 1982.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Area and commodity	1978	1979	1980	1981[p]	1982[e]
BANGLADESH[2]					
Cement, hydraulic[3]	338,614	322,473	335,964	344,830	[4]326,247
Clays: Kaolin[3]	5,778	7,305	10,278	9,825	[4]5,770
Gas, natural, marketed[3 5] million cubic feet	34,294	39,265	45,364	49,936	[4]63,717
Iron and steel metal:[3]					
Steel, crude (ingots only)	116,916	126,371	137,557	139,343	[4]108,624
Steel products	138,277	200,415	169,327	186,013	[4]172,080
Nitrogen: N content of ammonia	105,100	167,132	139,361	152,493	[4]182,252
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	523	473	440	NA	NA
Jet fuel do.	55	60	18	NA	NA
Kerosine do.	2,289	2,529	2,499	NA	NA
Distillate fuel oil do.	746	1,005	1,168	NA	NA
Residual fuel oil do.	2,742	3,380	2,574	NA	NA
Naphtha do.		585	785	NA	NA
Unspecified do.	1,174				
Refinery fuel and losses do.	278	[e]306	287	NA	NA
Total do.	7,807	8,605	8,083	NA	NA
Salt, marine[3]	785,517	674,074	[e]700,000	[e]700,000	700,000
Stone: Limestone, industrial[3]	[r]61,020	[r]57,646	45,480	38,550	[4]44,592
BRUNEI[2]					
Gas, natural:					
Gross million cubic feet	[e]342,000	344,000	386,900	385,000	380,000
Marketed do.	[r]310,767	[r]307,236	344,670	342,551	338,000
Natural gas liquids:					
Condensate thousand 42-gallon barrels	[r]4,050	[r]4,140	3,780	4,230	4,170
Natural gasoline do.	[r]765	[r]680	765	196	190
Liquefied petroleum gas do.	[r]162	[r]209	232	104	100
Total do.	[r]4,977	[r]5,029	4,777	4,530	4,460
Petroleum and refinery products:					
Crude do.	[r]74,953	[r]85,410	86,010	63,806	[4]62,339
Refinery products:					
Gasoline do.	[r]161	[r]161	178	553	560
Distillate fuel oil do.	[r]380	[r]410	433	276	280
Residual fuel oil do.	1	[r]7	7	1	1
Other including refinery fuel and losses do.	[r]208	[r]240	292	138	139
Total do.	[r]750	[r]818	910	968	980
CHRISTMAS ISLAND[2]					
Phosphate rock thousand metric tons	1,386	1,367	1,713	1,423	[4]1,328
HONG KONG[2]					
Cement, hydraulic do.	1,236	1,279	1,489	1,517	1,436
Clays: Kaolin	25,655	2,841	748	8,216	286
Feldspar	3,157	742	2,974	194	1,744
Feldspar sand	--	--	12,964	3,325	31,114
Iron and steel metal: Steel, crude[e]	75,000	90,000	90,000	120,000	120,000
Quartz	665	2	12	--	--
KAMPUCHEA[e 2]					
Cement, hydraulic	10,000				
Salt	12,000	26,500	30,000	32,000	40,000
NORTH KOREA[2]					
Aluminum metal ingot, primary	10,000	10,000	10,000	10,000	10,000
Barite	110,000	110,000	110,000	110,000	110,000
Cadmium metal, smelter	150	150	150	150	150
Cement, hydraulic thousand tons	7,000	8,000	8,000	8,000	8,000
Coal: Anthracite do.	35,000	35,000	36,000	36,000	36,000
Coke do.	2,700	2,800	2,900	3,000	3,000
Copper:					
Mine output, metal content	15,000	15,000	15,000	15,000	15,000
Metal:					
Smelter, primary and secondary	20,000	18,000	18,000	18,000	18,000
Refined, primary and secondary	25,000	22,000	22,000	22,000	22,000
Fluorspar	40,000	40,000	40,000	40,000	40,000
Gold, mine output, metal content troy ounces	160,000	160,000	160,000	160,000	160,000
Graphite	20,000	25,000	25,000	25,000	25,000

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1978	1979	1980	1981[p]	1982[e]
NORTH KOREA[2] —Continued					
Iron and steel:					
Iron ore and concentrate, marketable:					
Gross weight ____ thousand tons	7,100	7,400	8,000	8,000	8,000
Fe content ____ do	2,900	3,000	3,200	3,200	3,200
Metal:					
Pig iron ____ do	2,800	2,900	3,000	3,000	3,000
Ferroalloys, furnace type unspecified ____ do	110	110	120	120	120
Steel, crude ____ do	3,200	3,400	3,500	3,500	3,500
Lead:					
Mine output, metal content	105,000	100,000	100,000	100,000	100,000
Metal, primary and secondary	75,000	70,000	70,000	70,000	10,000
Magnesite:					
Crude ____ thousand tons	1,560	1,825	1,850	1,900	1,900
Calcined ____ do	650	760	770	800	800
Nitrogen: N content of ammonia ____ do	450	450	450	450	450
Phosphate rock	500,000	550,000	550,000	550,000	550,000
Pyrite and pyrrhotite (including cuprous), gross weight ____ thousand tons	620	620	620	620	620
Salt, all types	560,000	560,000	570,000	570,000	570,000
Silver, mine output, metal content ____ thousand troy ounces	1,600	1,550	1,550	1,550	1,550
Sulfur ____ thousand tons	265	265	265	265	265
Talc, soapstone, pyrophyllite	150,000	160,000	170,000	170,000	170,000
Tungsten, mine output, metal content	2,150	2,150	2,200	2,200	2,200
Zinc:					
Mine output, metal content	145,000	145,000	140,000	140,000	140,000
Metal, primary	130,000	120,000	120,000	120,000	120,000
LAOS[e 2]					
Gypsum	--	--	20,000	40,500	40,000
Salt, rock	15,000	18,000	20,000	20,000	20,000
Tin, mine output, metal content	r100	r170	r290	r200	150
MONGOLIA[2]					
Cement, hydraulic ____ thousand metric tons	166	183	178	210	350
Coal:					
Anthracite and bituminous[e] ____ do	250	250	250	250	250
Lignite and brown[e] ____ do	3,548	3,864	4,126	4,350	4,980
Total ____ do	3,798	4,114	4,376	4,600	5,230
Copper, mine output, metal content	e4,000	21,700	44,000	71,800	118,000
Fluorspar, all grades ____ thousand metric tons	455	567	604	595	670
Gypsum[e] ____ do	28	28	30	30	30
Lime, hydrated and quicklime[e] ____ do	36	46	50	50	60
Molybdenum, mine output, metal content[e]	40	222	487	661	1,000
Petroleum refinery products:[e]					
Kerosine ____ thousand 42-gallon barrels	23	23	23	23	23
Residual fuel oil ____ do	20	20	20	20	20
Salt[e]	15,000	15,000	15,000	15,000	15,000
NEPAL[e]					
Beryllium: Beryl, industrial-grade (10%-12% BeO) ____ kilograms	320	120	140	102	100
Cement, hydraulic	35,850	21,364	30,744	30,574	25,000
Clay for cement manufacture	3,000	4,000	4,000	2,000	2,000
Coal: Lignite	1,700	37,530	3,461	8,174	8,000
Copper ore:					
Gross weight	e35	--	6	6	6
Cu content	7	--	1	2	2
Gem stones:					
Beryl ____ kilograms	2	--	NA	NA	NA
Garnet ____ do	12,000	4,000	r41,295	105,925	NA
Tourmaline ____ do	50	25	NA	13	10
Lime, agricultural	NA	10,054	e10,000	e10,000	10,000
Magnesite, crude	--	--	e15,000	e20,000	20,000
Salt	7	7	8	8	10
Stone:					
Limestone	50,000	62,400	32,400	83,565	80,000
Marble:					
Chips	131	66	343	366	400
Cut ____ square meters	1,370	863	3,083	3,561	4,000
Craggy ____ cubic meters	2,320	799	NA	963	1,000
Talc	510	325	1,460	71	100

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1978	1979	1980	1981[p]	1982[e]
SINGAPORE[2]					
Cement, hydraulic thousand metric tons	[e]1,350	[e]1,350	1,952	2,253	2,000
Iron and steel metal: Steel, crude do	280	297	340	[e]350	350
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	10,679	17,664	19,144	21,072	14,562
Jet fuel do	35,970	31,221	32,914	35,228	28,922
Kerosine do	18,094	20,322	20,610	27,224	29,144
Distillate fuel oil do	59,775	62,304	63,321	83,008	91,992
Residual fuel oil do	78,424	85,705	81,309	99,270	80,902
Lubricants do	3,964	4,316	4,269	3,740	3,152
Other do	33,131	35,538	30,453	35,728	44,966
Refinery fuel and losses do	9,953	6,741	10,404	6,755	11,391
Total do	249,990	263,811	262,424	312,025	305,031
Stone: Granite, broken thousand cubic meters	2,235	2,507	3,185	4,474	5,947
Sulfur, byproduct of petroleum	[e]25,000	[r]2,900	11,300	[e]400	500
SRI LANKA					
Cement, hydraulic thousand metric tons	575	592	571	642	650
Clays:					
Ball clay	2,309	13,291	11,457	9,234	[4]9,291
Kaolin	5,541	5,870	6,614	7,292	[4]8,206
Brick and tile clay	86,000	[e]90,000	62,518	[e]60,000	60,000
Clay for cement manufacture	103,232	90,988	21,148	39,081	62,591
Feldspar, crude and ground	3,160	3,790	3,955	[e]4,000	2,922
Gem stones, precious and semiprecious, except diamond value, thousands	$33,718	$31,919	$42,819	$201	NA
Graphite, all grades	10,506	9,402	7,794	7,573	[4]8,803
Iron and steel metal: Semimanufactures	[e]30,000	[e]30,000	NA	--	--
Mica, scrap	140	369	145	182	291
Nitrogen: N content of ammonia	--	--	--	43,100	103,600
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	1,098	782	[e]910	NA	968
Jet fuel do	276	248	[e]270	NA	908
Kerosine do	1,632	1,449	[e]1,600	NA	[4]1,226
Distillate fuel oil do	2,681	2,410	[e]3,550	NA	[4]4,783
Residual fuel oil do	3,646	3,563	[e]4,800	NA	4,833
Other do	1,069	[e]1,100	[e]1,450	NA	1,000
Refinery fuel and losses do	390	[e]387	[e]520	NA	600
Total do	10,792	9,939	[e]13,100	NA	14,318
Phosphate rock	--	9,063	5,000	15,294	20,000
Rare-earth metals: Monazite concentrate, gross weight	213	213	63	60	[4]304
Salt	149,825	121,443	114,279	104,388	[4]176,437
Sand, glass	[e]1,500	2,370	--	--	--
Stone:					
Limestone thousand metric tons	975	1,132	1,261	1,812	[4]1,616
Quartz, massive	803	676	741	[e]800	[4]794
Titanium concentrates, gross weight:					
Ilmenite	33,041	55,370	33,956	80,011	[4]68,282
Rutile	11,497	14,675	12,789	13,301	[4]7,212
Zirconium: Zircon concentrate, gross weight	3,297	1,510	3,031	3,266	[4]5,789
VIETNAM[8]					
Cement, hydraulic thousand metric tons	843	729	641	545	800
Chromium: Chromite	13,100	[e]14,000	[e]15,000	15,000	16,000
Clays: Kaolin[e]	1,100	1,200	1,250	1,250	1,000
Coal: Anthracite thousand metric tons	6,000	5,300	5,300	5,900	5,700
Gypsum[e]	13,600	14,000	15,000	15,000	25,000
Iron and steel metal:					
Ingot steel thousand metric tons	98	[e]110	[e]120	[e]110	120
Rolled steel[e] do	50	106	62	65	40
Nitrogen: N content of ammonia[e]	(9)	(9)	(9)	(9)	(9)
Phosphate rock:[e]					
Gross weight thousand metric tons	[r]1,800	[r]200	[r]90	[r]110	160
P_2O_5 content do	594	65	30	36	53
Salt do	530	[e]525	437	403	650
Tin:					
Mine output	[e]250	[e]200	370	380	500
Metal, smelter	(10)	(10)	(10)	(10)	475

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1978	1979	1980	1981[p]	1982[e]
VIETNAM[8] —Continued					
Zinc:[e]					
Mine output, metal content	8,000	6,000	6,500	6,000	6,000
Metal, smelter, primary	7,200	5,400	5,500	[r]5,000	5,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 3, 1983.

[2]In addition to the commodities listed, other crude construction materials such as sand and gravel and other varieties of stone presumably are produced, but available general information is inadequate to make reliable estimates of output levels.

[3]Data are for years ending June 30 of that stated.

[4]Reported figure.

[5]Gross production is not reported; the quantity vented, flared, or reinjected is believed to be negligible.

[6]Data are for the Nepalese fiscal year ending mid-July of that stated.

[7]Figure includes both gem- and industrial-grade garnet; 4,295 kilograms of gem quality and 37,000 kilograms of industrial quality.

[8]In addition to the commodities listed, iron ore was mined in the past and pig iron was produced at industrial facilities, but the status of these industries under prevailing conditions is not sufficiently clear to allow formulation of reliable estimates of output levels. Similarly, data on output of crude construction materials are not available, and no basis is available to make reliable estimates of output levels.

[9]Nitrogen (N content of ammonia) production capacity of the country's only known plant is 54,000 tons per year; it is not known at what output level the plant is operating.

[10]Revised to zero.

COMMODITY REVIEW

Metals.—*Iron and Steel.*—Bangladesh's Government-owned steel industry consisted of an old four-unit, open-hearth-based plant in Chittagong with a 250,000-ton-per-year capacity, commissioned in 1967. The plant reportedly has never been operated at an efficient capacity level and has lost over 500 million taka since opening.

Plans were drawn up to completely modernize the plant and increase the output capacity to 370,000 tons per year. Two electric arc furnaces and continuous-casting equipment would replace the old furnaces. The Government announced, however, in April 1982 that plans for the modernization were being dropped, at least temporarily. Although opinions differed as to the reasons for dropping the plan, it was speculated that lack of funds was the real reason and that if low-interest financing was offered, the authorization for the work would quickly follow.

Another plan, independent of the aforementioned, was for the establishment of a 600,000-ton-per-year, natural gas-based, direct reduction steel mill also at Chittagong. A Japanese team of technical experts was due to visit Bangladesh in early 1983 to make a preliminary study regarding the facility.

The direct reduction plant would operate on imported raw material except for the gas and electric power; the existing plant used some domestic scrap but in turn was fueled with imported oil.

Nonmetals.—*Fertilizer Materials.*—The new Ashuganj nitrogen fertilizer complex, the largest industrial plant in the country, was renamed the Zia Fertilizer Co. Production at the plant was not up to projected levels. In fiscal year 1981, it produced only about two-thirds of its target production. The plant was closed during part of July and produced only 1,600 tons against a target of 20,000 tons. Zia Fertilizer received natural gas from the adjacent Titas Gasfield and the more distant Habiganj Gasfield. A 33-kilometer, 30.5-centimeter-diameter pipeline was commissioned in 1981, linking Habiganj to the existing Titas Gasfield distribution system to supply 50 million cubic feet per day to Zia Fertilizer.

The combined production of the plants at Ghorasal and Fenchuganj and the new Zia Fertilizer factory should make the country self-sufficient in nitrogen if each plant operated at design capacity. However, projected demand for fiscal year 1984 was put at 1.5 million tons of nitrogenous fertilizer. To meet this demand, new plants were planned using the abundant natural gas reserves as raw material (as do the existing plants).

Two large plants were planned for the Chittagong area and would be served by the Bakhrabad pipeline. Progress apparently was slow during the year. Prequalification documents were submitted by 12 contractors in August 1981, but the tender documents, which were expected to be issued in

February 1982, reportedly had not been sent out by May 1982. The plant was to be designed for 1,000 tons per day of ammonia and 1,700 tons per day of urea. Financing of the more than $300 million cost was to be obtained from seven financing agencies, the majority from the Asian Development Bank and Overseas Economic Fund of Japan. The complicated financial arrangements were believed to be causing at least part of the delay in issuing the tender documents.

The Karnaphuli Fertilizer Co. Ltd. was set up to operate the second plant. It was to be fabricated on a barge by Swedyards Corp. in Sweden and floated to the site in Bangladesh. Formal contracts were to be signed in June 1982, but it was not known if the signing took place on schedule.

Another industry that was to use Bakhrabad natural gas was planned for Chittagong. A 1,250-ton-per-day methanol plant was to be built at a cost of $250 million. Financing was being arranged, and the output would be exported to earn foreign exchange.

Mineral Fuels.—*Coal.*—One potentially important mineral resource was a 33-meter-thick, deep-lying seam of coal at Jamalganj in northern Bangladesh. The coal was of good quality, with a carbon content of 80% and a heat value of 11,870 British thermal units per pound. Reserves were estimated at 1 billion tons. The deposit has been studied intermittently since 1962. One recent recommendation was to sink an exploratory shaft rather than continue test borings and additional detailed seismic surveys. The shaft would generate engineering information on underground conditions to facilitate design and development of the mine. If the findings were favorable, the exploratory shaft could eventually be incorporated into the ventilation system of the mine. If not successful, the project would be abandoned at relatively little cost.

The consumption of coal in Bangladesh was about 200,000 tons per year, with brickmaking, industry, and the railroads being the major consumers. Present consumption could be greatly increased if the coal was available at a favorable price.

Bangladesh officials felt that an active development program was needed now in light of the long leadtime needed for this type of project.[4]

Petroleum and Natural Gas.—Development drilling at the Bakhrabad Gasfield was completed in September. The five wells will have a production capacity of 150 million cubic feet per day. The gas gathering and processing facilities were expected to be completed by June 1983. The 110-kilometer pipeline connecting Bakhrabad with Chittagong was under construction during the year. Satellite hookups will also be made to serve Comilla, Chandpur, Laksham, and Feni along the main pipeline route. Approximately 2,000 kilometers of feeder and service lines will be constructed. The International Bank for Reconstruction and Development (World Bank) and the Organization of Petroleum Exporting Countries (OPEC) were funding the pipeline.

Renovation and expansion of the Titas Gasfield was also underway as part of the overall system to bring gas service to the Chittagong area. Ninety-two kilometers of 41-centimeter pipeline will be added in the Titas area, and gas from both Titas and Bakhrabad reportedly will feed the Chittagong pipeline. The new system will serve 1,000 industrial users, 8,000 commercial customers, and an estimated 300,000 domestic consumers.

Exploration drilling was continuing at several sites around the country by the Bangladesh Oil and Gas Corp. (Petrobangla) or contractors drilling for the Government-owned company. Reports of several new gas discoveries were made during the year. In some cases, however, further development of a potential field was delayed for lack of additional capital investment.

The discovery well at Beanibazar indicated estimated recoverable reserves at 0.8 trillion cubic feet with 20 barrels of condensate per million cubic feet of gas. A West German grant in November 1980 paid for the $13 million cost of the exploratory drilling at this site.

Petrobangla was concentrating on drilling in Sitakund and Patharia Townships where oil seeps have been discovered.

The Royal Dutch/Shell Group was the only foreign company conducting exploration during 1982. It was making a seismic survey in its block 14 contract area adjacent to the Burmese and Indian border. Shell Oil Co. reportedly signed a 25-year, production-sharing contract in May.

To accelerate the search for oil in the country, the Government planned to make an additional 16 blocks available to foreign oil companies under production-sharing contracts. The 16 blocks comprise the entire onshore and offshore area with the exception of the delineated gasfield areas and Shell's block 14. The last time Bangladesh offered foreign oil companies the option to participate in exploration was 1974. The

country currently spends from 70% to 85% of export earnings on imported crude oil and refined products. The Government would like to cut this dependence on expensive imports and decided the quickest and least expensive way was to invite outside exploration via the production-sharing route. Contract terms, other than Shell's, have not been decided.

The possibility of exporting natural gas to India has been raised several times in recent years. The heads of state of both countries met in October, and the question of gas exports was to be discussed. Bangladesh was considering offering from 100 to 150 million cubic feet per day to India. West Bengal State in India, adjacent to the Bangladesh border, has a chronic energy shortage and could readily use the gas. Overall cost, financing, and political considerations appeared to be more important to initiating an agreement than any technical constraints.

Eastern Refinery Ltd. at Chittagong, the country's only oil refinery, closed in October for 2 months for maintenance. The plant had not had a major overhauling since its commissioning in 1968. Its 1.5-million-ton-per-year capacity had slowly declined to an actual output of about 1.2 million tons per year.

Petrobangla planned to expand the refinery and add secondary processing units to increase the output of middle distillates. Funding for the work was expected to come from the World Bank.

BRUNEI[5]

The only mineral industry operations of any world significance in the Independent Sultanate of Brunei were, as in past years, those of the modest petroleum and natural gas industry. These activities, however, although of only modest significance to the world, continued to be the overwhelmingly dominant factor in the economy of the Sultanate, a 5,765-square-kilometer area on the northwest coast of the Island of Kalamantan (Borneo), with a population of somewhat over 210,000. Despite cutbacks in output of both petroleum and natural gas for a second year, chiefly as a result of the world crude oil market glut, Brunei's petroleum and gas industry again accounted for nearly 90% of the GDP and for virtually 100% of foreign exchange earnings.

There has been a general downturn in the output of crude materials for the past 2 years, chiefly because of the worldwide oversupply of crude oil. Presumably, Brunei would have been able to market more natural gas in 1981 and 1982, up at least to the 1980 level, if it had been possible to produce more gas without getting additional oil, but the gas-oil ratios of the producing fields evidently precluded this. Refinery output has only been reported through 1980; estimates for 1981 and 1982 are based on available information on refinery capacity, internal product demand, and external trade data.

The importance of Brunei's exports of petroleum and natural gas to the Sultanate's trade balance is demonstrated by trade value figures for 1980 and 1981, the most recent years for which complete results are available. In 1981, the value of commodity exports and reexports was $4,066 million, of which petroleum and natural gas accounted for 98.9% and was distributed as follows: crude oil, 55.6%; natural gas, 39.5%; and refined oil, 3.8%. All other mineral commodities represented only 0.3% of the total, and all nonmineral commodities, only 0.8%. The 1981 total of exports and reexports was about 10% below the 1980 level of $4,519 million, which was distributed as follows: crude oil, 61.8%; natural gas, 30.9%; refined oil, 5.9%; other minerals, 0.3%; and nonmineral commodities, 1.4%. The 1981 cutback in oil exports and increase in gas shipments are clearly demonstrated in these figures.

Total commodity imports in 1981 were valued at $596 million, a level equivalent to only 14.7% of exports plus reexports, giving the Sultanate a positive trade balance of over $3,470 million. Of the total 1981 commodity imports, all mineral commodity imports accounted for only 18.3% compared with 19.8% of the 1980 total of $566 million. Among mineral commodity imports, iron and steel was the overwhelmingly dominant category in both 1980 and 1981, accounting for 12.6% of total commodity imports in each year, or between 60% and 70% of total mineral commodity imports.

COMMODITY REVIEW

Petroleum and Natural Gas.—Although the output of crude oil and natural gas declined for a second consecutive year, this was not as unfavorable as it might appear for the Sultanate. The decline, principally

caused by the worldwide crude oil glut, fitted well into the plans of the Government to reduce output to levels more in line with the economic needs of the Government, thereby extending the life of the fields.

Although Brunei Shell Petroleum Co. (BSP) remained the only oil and gas producer through 1982, a second firm was moving toward producer status. In May, Jarra Jackson Pte. Ltd., a Brunei company 75% owned by the Texas-based U.S. independent oil firm Jackson Exploration Inc., signed an offshore concession agreement with Brunei's Government. The agreement covers 3,136 square kilometers, in water depths ranging from 18 to 180 meters, for a period of 30 years. The acreage involved was held by BSP until relinquished in 1980 and apparently offers considerable potential to the new concessionaire. Drilling was expected to begin in this area in early 1983.

The Sultanate's long-term traditional producer, BSP, after a period of relative inactivity in the exploration area, was conducting seismic tests in its third offshore concession, acquired in 1981, and was expected to start drilling in this new area in 1984.

BSP's main activity in 1982 was development of secondary recovery facilities in the Champion Field. The secondary recovery process involves water injection and dry gas lift, using gas obtained in this field. Gas from the Champion Field not needed for this purpose is piped to the Brunei liquefied natural gas plant for use as boiler fuel for the liquefaction of the cleaner, more valuable gas from the Southwest Ampa and Fairley Fields.

BSP apparently continued to emphasize production of gas from fields with little or no associated oil to meet the terms of its 20-year contract with Japan for liquefied natural gas.

Table 2.—Brunei: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	1	--		
Aluminum: Metal including alloys:				
Unwrought	43	32	--	Singapore 23.
Semimanufactures	30	31	--	Malaysia 25.
Copper: Metal including alloys, semimanufactures	48	10	--	All to Malaysia.
Iron and steel: Metal:				
Scrap	177	5,131	--	Thailand 2,032; Japan 1,016.
Steel, primary forms	--	1	--	All to Singapore.
Semimanufactures:				
Bars, rods, angles, shapes, sections	800	700	--	Malaysia 311; Indonesia 224; Singapore 151.
Universals, plates, sheets	213	187	--	Malaysia 75; Indonesia 71; Singapore 38.
Rails and accessories	1	--		
Wire	159	111	--	Malaysia 110.
Tubes, pipes, fittings	12,597	11,284	1	Malaysia 7,414; Indonesia 1,887; Singapore 1,435.
Castings and forgings, rough	77	76	--	Singapore 54; Indonesia 14.
Lead: Metal including alloys, all forms	--	1	--	All to Singapore.
Nickel: Metal including alloys, semimanufactures	1	--		
Platinum-group metals: Metal including alloys, unwrought and partly wrought, unspecified value, thousands	--	$3	--	All to Malaysia.
Tin: Metal including alloys, semimanufactures	1	4	--	Mainly to Malaysia.
Uranium and/or thorium: Ore and concentrate value, thousands	--	$1	--	All to Singapore.
Zinc: Metal including alloys:				
Unwrought	3	--		
Semimanufactures	5	1	--	All to Malaysia.
Other:				
Ashes and residues	566	835	--	Malaysia 515; Singapore 320.
Nonferrous metal waste and scrap	2	25	--	Singapore 20.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	1	2	--	United Kingdom 1.
Cement	18,715	14,709	30	Malaysia 14,678.
Clays and clay products:				
Crude	742	--		

Table 2.—Brunei: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products —Continued				
Products:				
Nonrefractory value, thousands	$576	$907	--	Singapore $492; Malaysia $415.
Refractory including nonclay brick	--	3	--	All to Singapore.
Fertilizer materials: Manufactured, ammonia value, thousands	$1	--		
Halogens: Chlorine do	$7	$9	--	All to Singapore.
Salt and brine	3	--		
Sodium and potassium compounds, n.e.s.: Sodium hydroxide	3	--		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	203	55	--	All to Malaysia.
Worked	3	4	--	Malaysia 3.
Gravel and crushed rock	2,067	704	--	All to Malaysia.
Other:				
Crude	603	2	NA	NA.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	19	22	--	Malaysia 14; Singapore 8.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	9	--	All to Malaysia.
Gas natural value, thousands	$1,396,908	$1,607,273	--	All to Japan.
Hydrogen, helium, rare gases do	$15	$32	--	All to Malaysia.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	82,273	58,883	10,936	Japan 27,148; Singapore 7,638; Thailand 3,273.
Refinery products:				
Gasoline, motor do	6,812	4,011	173	Japan 3,591; Australia 237.
Kerosine and jet fuel 42-gallon barrels	8,254	14,144	--	Malaysia 13,748.
Distillate fuel oil do	433	--		
Lubricants do	210	105	--	All to Malaysia.
Nonlubricating oils do	25	13	--	All to Republic of Korea.
Bituminous mixtures do	5,309	4,163	--	All to Malaysia.
Tars and other crude chemicals derived from coal, gas, and petroleum	--	1	--	Do.

NA Not available.

Table 3.—Brunei: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals	10	1	(1)	Mainly from Singapore.
Aluminum:				
Oxides and hydroxides	42	1	--	Mainly from United Kingdom.
Metal including alloys:				
Unwrought	63	148	--	United Kingdom 145.
Semimanufactures	463	956	26	Singapore 629; Japan 91; Hong Kong 87.
Copper:				
Ore and concentrate	202	--		
Metal including alloys:				
Unwrought	4	2	(1)	Mainly from Singapore.
Semimanufactures	72,892	826	23	Hong Kong 268; Singapore 249; Japan 140.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	5	22	--	Australia 16.
Metal:				
Pig iron, cast iron, related materials	47	--		
Ferroalloys value, thousands	--	$4	$4	
Steel, primary forms	44	16	(1)	Singapore 9; China 7.

See footnotes at end of table.

Table 3.—Brunei: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	24,959	32,254	594	Japan 16,444; Singapore 4,731; China 1,403.
Universals, plates, sheets	4,225	5,856	95	Japan 2,788; Singapore 1,842; Netherlands 668.
Hoop and strip	5	16	--	Singapore 12.
Rails and accessories	7	16	--	United Kingdom 9; Singapore 4.
Wire	631	539	1	Singapore 395; China 109.
Tubes, pipes, fittings	75,790	70,182	2,054	Japan 50,212; Singapore 15,552.
Castings and forgings, rough	812	841	3	Singapore 400; Japan 224.
Lead: Metal including alloys:				
Unwrought	3	1	--	Mainly from Singapore.
Semimanufactures	58	73	(1)	Singapore 56.
Manganese: Oxides	5	--	--	
Mercury value, thousands	$3	$1	--	All from United Kingdom.
Metalloids do	$1	--		
Nickel: Metal including alloys, semimanufactures	3	3	--	Japan 2.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	--	$98	--	United Kingdom $92.
Tin: Metal including alloys:				
Unwrought	1,194	1	--	Mainly from Singapore.
Semimanufactures	14	33	--	Japan 24.
Uranium and/or thorium: Ore and concentrate value, thousands	$18	$74	$59	United Kingdom $13.
Zinc: Metal including alloys:				
Unwrought	392	10	(1)	Japan 9.
Semimanufactures	38	4	--	Japan 2.
Other:				
Ashes and residues	1,068	8,430	122	Singapore 5,434; Japan 2,848.
Pyrophoric alloys value, thousands	--	$2	--	NA.
Nonferrous metal waste and scrap	--	3,063	NA	NA.
Base metals including alloys, all forms	2	1	--	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	4	3	NA.
Grinding and polishing wheels and stones value, thousands	$67	$138	$62	Japan $32; United Kingdom $15.
Cement	117,361	111,736	1	NA.
Clays and clay products:				
Crude, unspecified	4,833	2,996	839	Singapore 2,157.
Products:				
Nonrefractory value, thousands	$2,172	$3,157	--	West Germany $679; China $674; Singapore $585.
Refractory including nonclay brick	1	7	--	All from Singapore.
Cryolite and chiolite	1	--		
Fertilizer materials: Manufactured:				
Ammonia	9	10	3	Singapore 6.
Nitrogenous	--	302	20	Singapore 254.
Phosphatic	841	519	--	Japan 517.
Potassic	646	--		
Unspecified and mixed	21	56	(1)	West Germany 26; Singapore 23.
Gypsum and plaster	56	77	7	Thailand 62.
Halogens:				
Chlorine value, thousands	$160	$183	$5	Singapore $110; Malaysia $46.
Unspecified do	$3	--		
Lime	524	106	--	United Kingdom 85; Singapore 19.
Mica:				
Crude including splittings and waste	58	25	--	All from Canada.
Worked including agglomerated splittings value, thousands	$7	--		
Nitrates, crude	47	63	--	Singapore 37; West Germany 21.
Phosphates, crude	57	155	--	United Kingdom 143.
Pigments, mineral: Natural, crude	3	--		
Potassium salts, crude	24	147	--	West Germany 122.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	--	$7	--	Singapore $5.
Synthetic do	--	$5	$4	Hong Kong $1.
Salt and brine	4,202	4,619	--	Netherlands 3,944; Singapore 515.

See footnotes at end of table.

Table 3.—Brunei: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	11	5	--	Singapore 4.
Sodium hydroxide	757	392	--	Netherlands 348.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	661	47	--	Italy 38.
Worked	354	2,713	--	NA.
Gravel and crushed rock	25,031	26,855	188	Malaysia 26,635.
Limestone other than dimension	3	24	--	Singapore 14; Malaysia 10.
Sand other than metal-bearing	476	7,158	178	Malaysia 6,915.
Sulfur:				
Elemental: Colloidal, precipitated, sublimed value, thousands	--	$1	--	All from Norway.
Dioxide	54	--		
Sulfuric acid	83	47	2	Singapore 45.
Other:				
Crude	--	1,845	2	Thailand 1,381.
Slag and dross, not metal-bearing	--	764	--	All from Singapore.
Building materials of asphalt, asbestos and fiber cements, unfired non-metals	2,453	2,945	146	Singapore 1,245; Malaysia 755; Australia 327.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	7	--	China 5.
Carbon:				
Carbon black	--	1	--	All from United Kingdom.
Gas carbon	(2)	3	--	All from Singapore.
Coke and semicoke	1,853	10	--	All from Australia.
Hydrogen, helium, rare gases value, thousands	$101	$329	$11	Singapore $287.
Petroleum refinery products:				
Gasoline, motor—42-gallon barrels	390,014	190,596	17	Singapore 190,578.
Mineral jelly and wax ——do——	--	8	--	All from Japan.
Kerosine and jet fuel ——do——	178	186	23	NA.
Distillate fuel oil ——do——	3,685	--		
Lubricants ——do——	32,265	26,348	1,456	Singapore 21,749; United Kingdom 2,254.
Nonlubricating oils ——do——	2,583	2,539	25	Singapore 2,450.
Residual fuel oil ——do——	--	73	73	
Bituminous mixtures ——do——	7,454	6,260	927	Singapore 4,963.
Tars and other crude chemicals derived from coal, gas, and petroleum	449	542	--	Singapore 539.

NA Not available.
[1]Less than 1/2 unit.
[2]Unreported quantity valued at $1,000.

CHRISTMAS ISLAND[5]

Commercial mineral industry activity on tiny Christmas Island was confined, as in previous years, to mining phosphate rock. The 135-square-kilometer Indian Ocean island, 360 kilometers due south of Java Head, with a population of about 3,000, remained under the control of Australia. Christmas Island ranked 13th among world phosphate rock producers in 1982 on the basis of gross weight of ore, with about 1% of the total and 12th on the basis of P_2O_5 content, with about 1.2% of the total.

The Phosphate Mining Co. of Christmas Island, which replaced the British Phosphate Commission in 1981 as the island's sole producer, continued to operate throughout 1982.

The Union of Christmas Island Workers in late 1982 reportedly lodged a complaint in Australia to the effect that the market in Australia for Christmas Island's product had been unfairly eroded by increased sales of U.S.-produced phosphates at prices virtually one-half of the 1981 level. At yearend, there was no formal response to the complaint nor had any action been taken by the Australian Government.

A reassessment of the island's exploitable phosphate reserves was undertaken during 1982, and as a result, totals were increased

significantly. With the drilling and evaluation process not complete, reserves of "A" grade rock, about 35% P_2O_5, and those of "B" grade rock, somewhat lower in grade, were reported at 14 million tons each. Presumably, the latter figure represents the amount of B-grade material that can be commercially exploited under present conditions of water availability, for this material must be processed by wet desliming to be salable, and the water supply for this purpose at present limits output to about 300,000 tons annually. An earlier assessment of B-grade ore indicated the existence of some 50 million tons of this material. Additionally, the island reportedly has 145 million tons of "C" grade ore, but this material has been marketed only in very limited quantities in Indonesia after crushing, drying, and calcining under the trade names citrophos and calciphos, for direct application. This material is regarded as not being satisfactory for production of superphosphate.

Development plans call for the extraction of about 1 million tons of A-grade ore annually, together with 300,000 to 400,000 tons of B-grade ore, there being no indication of anticipated production of C-grade ore.

Table 4.—Christmas Island: Exports of phosphate rock, by destination

(Thousand metric tons)

Destination	1980	1981	1982
Australia	853	735	780
Indonesia	7	--	2
Korea, Republic of	--	--	16
Malaysia	157	127	143
New Zealand	602	480	426
Singapore	19	18	--
Total	1,638	1,360	1,367

HONG KONG[6]

Land-use conflict in Hong Kong is a major problem. About 9% of the total land area of 1,064 square kilometers is used for farming and 16% for urban and developed areas, while the remaining 75% is largely land of marginal usefulness. Mining activity is insignificant to Hong Kong's economy with only small quantities of kaolin, feldspar, and quartz produced from open pit operations. At the end of 1982, there were only four mining licenses issued by the Commissioner of Mines in operation.

Hong Kong's largest industrial sector was textiles and clothing, followed by electronics, plastics, watches and clocks, and other light industries. All sectors are export oriented.[7]

Total merchandise trade was $44.5 billion.[8] Imports rose by 3% over that of 1981 to $23.5 billion, domestic exports by 3% to $13.7 billion, and reexports by 6% to $7.3 billion. Hong Kong is almost entirely dependent on imported goods to meet the needs of its population and industries. China and Japan were the principal suppliers of imports, providing 23% and 22%, respectively. The largest export market was the United States, accounting for 38%, followed by the United Kingdom, 9%; the Federal Republic of Germany, 8%; and China, 5%.[9]

Table 5.—Hong Kong: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	17,440	11,538	--	Taiwan 8,850; Republic of Korea 1,769; Indonesia 699.
Oxides and hydroxides	2,576	2,242	--	Indonesia 2,155; Nigeria 50.
Metal including alloys, all forms	31,626	41,878	1,692	Japan 14,185; Indonesia 6,525; North Korea 5,099.
Chromium: Oxides and hydroxides	258	108	--	Republic of Korea 50; Indonesia 35.
Cobalt: Oxides and hydroxides	5	20	--	Taiwan 7; Singapore 6; Republic of Korea 4.
Copper:				
Oxides and hydroxides	4	18	--	China 16; Malaysia 2.
Sulfate	34	8	--	Taiwan 7; Indonesia 1.
Metal including alloys, all forms	19,115	20,392	197	Japan 15,279; Taiwan 1,367; Republic of Korea 767.

Table 5.—Hong Kong: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Gold:				
Waste and sweepings value, thousands	$1,258	$5,382	$821	Japan $4,321; Switzerland $166; West Germany $60.
Metal including alloys, unwrought and partly wrought troy ounces	959,666	73,561	225	United Kingdom 31,090; Macau 12,892; Japan 10,545.
Iron and steel: Metal:				
Scrap	329,649	364,360	202	Taiwan 292,485; Japan 36,601; Thailand 19,482.
Pig iron, ferroalloys, related materials	594	7,947	--	Indonesia 5,384; North Korea 1,027; Thailand 801.
Steel, primary forms	13,975	9,800	--	Philippines 5,690; Indonesia 4,110.
Semimanufactures	102,005	110,160	93	Macau 34,032; China 23,694; Indonesia 18,013.
Lead:				
Oxides	121	132	--	Indonesia 105; China 22.
Metal including alloys, all forms	2,273	3,052	--	Taiwan 2,567; China 196; Japan 172.
Magnesium: Metal including alloys, all forms	93	21	--	Japan 14; Philippines 5.
Manganese:				
Ore and concentrate	295	--	--	
Oxides	500	486	18	Indonesia 142; Ethiopia 120; Thailand 65.
Mercury 76-pound flasks	895	3,876	--	North Korea 3,017; Indonesia 363; Pakistan 323.
Metalloids:				
Arsenic: Oxides and acids	38	76	75	Ghana 1.
Unspecified	11	667	4	Republic of Korea 659.
Nickel:				
Oxides and hydroxides	59	180	--	Republic of Korea 77; Taiwan 75; Singapore 23.
Metal including alloys, all forms	2,546	3,549	--	Taiwan 1,528; Japan 725; Republic of Korea 695.
Platinum-group metals:				
Waste and sweepings value, thousands	$1,271	$1,514	--	West Germany $770; United Kingdom $689.
Metal including alloys, unwrought and partly wrought troy ounces	14,178	3,987	--	Taiwan 1,768; Japan 1,093; West Germany 804.
Silver:				
Waste and sweepings value, thousands	$120,729	$109,661	$15,892	United Kingdom $57,100; France $22,964; West Germany $5,871.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,974	1,326	260	United Kingdom 782; France 117; Taiwan 56.
Tin:				
Oxides kilograms	881	2,650	--	All to United Kingdom.
Metal including alloys, all forms	2,405	2,453	--	Taiwan 773; Japan 341; Singapore 292.
Titanium: Oxides kilograms	2,529	2,554	--	Indonesia 1,548; Taiwan 255; China 233.
Tungsten:				
Ore and concentrate	425	2,197	--	West Germany 1,706; Netherlands 362; North Korea 80.
Metal including alloys, all forms	2	[1]18	--	Singapore 14; United Kingdom 2.
Zinc:				
Oxides	31	198	--	Indonesia 100; China 36; Pakistan 20.
Metal including alloys, all forms	6,834	3,173	122	India 768; Philippines 511; Thailand 402.
Other:				
Oxides and hydroxides	242	53	--	Republic of Korea 19; Japan 17; Taiwan 9.
Ashes and residues	737	931	(2)	China 448; Taiwan 411; Japan 60.
Base metals including alloys, all forms	888	1,731	48	Japan 981; Belgium 412; Indonesia 96.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	7	177	--	Taiwan 120; Indonesia 29; Philippines 17.
Artificial: Corundum	188	888	--	Republic of Korea 462; Taiwan 363; Japan 40.
Dust and powder of precious and semiprecious stones including diamond value	$61,298	$77,952	--	Taiwan $58,777; Japan $15,887.
Grinding and polishing wheels and stones	1,180	1,012	14	Indonesia 708; Nigeria 105.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Asbestos, crude	8,492	3,127	--	Indonesia 3,098.
Barite and witherite	679	192	--	Republic of Korea 117; Indonesia 75.
Boron materials: Oxides and acids	331	933	--	Philippines 435; Taiwan 239; Republic of Korea 104.
Cement	22,318	24,293	--	China 18,687; Macau 4,253; Vietnam 1,253.
Clays and clay products:				
Crude	78,748	77,953	--	Taiwan 58,934; Indonesia 10,496; Republic of Korea 7,670.
Products:				
Nonrefractory[3]	4,275	5,304	4	Macau 2,788; China 1,395; Singapore 605.
Refractory including nonclay brick value, thousands	$1,276	$765	--	Nigeria $352; Indonesia $217; Taiwan $55.
Diamond:				
Gem, not set or strung carats	292,034	431,224	41,541	Israel 105,521; Singapore 89,047; Belgium 77,147.
Industrial do	26,102	12,986	1,034	Japan 9,221; United Kingdom 1,299; China 500.
Diatomite and other infusorial earth	37	35	--	All to India.
Feldspar, fluorspar, related materials	15,406	11,318	--	Indonesia 7,050; Taiwan 4,230; Philippines 38.
Fertilizer materials:				
Crude, n.e.s	738	664	3	China 335; Taiwan 270; Philippines 50.
Manufactured:				
Ammonia	7	25	--	Vietnam 22.
Unspecified and mixed	43,586	10,541	5	China 8,238; Kampuchea 1,800; Vietnam 200.
Graphite, natural	161	278	100	Indonesia 100; Taiwan 78.
Gypsum and plaster	1,423	1,172	3	Indonesia 1,049.
Halogens, unspecified kilograms	281	120	--	Singapore 100.
Lime	39	66	--	China 38; Macau 28.
Magnesium compounds:				
Magnesite	r4,394	8,660	--	Taiwan 7,510; Indonesia 1,050.
Oxides and hydroxides	680	328	--	All to Nigeria.
Mica:				
Crude including splittings and waste	36	8	--	Taiwan 7; Thailand 1.
Worked including agglomerated splittings	15	6	--	Indonesia 3; China 2; Chile 1.
Pigments, mineral:				
Natural, crude	476	400	--	All to Indonesia.
Iron oxides and hydroxides, processed	299	1,061	--	Indonesia 750; Egypt 250; China 47.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$143,740	$141,429	$32,886	Japan $41,789; Singapore $29,730; Switzerland $11,400.
Synthetic do	$1,143	$2,530	$855	Republic of Korea $801; Singapore $224; Japan $217.
Salt and brine	21	357	--	United Arab Emirates 240; China 44; Seychelles 40.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	170	407	--	Philippines 395.
Sodium carbonate, natural and manufactured	7,615	3,207	--	Indonesia 3,000; China 126.
Sodium hydroxide	319	4,959	--	Indonesia 3,702; North Korea 350; Philippines 277.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	2,520	1,608	52	Taiwan 924; Philippines 229; Indonesia 124.
Gravel and crushed rock	1,205	5,709	--	Malaysia 4,500; Indonesia 925; Japan 160.
Limestone other than dimension	1	110	--	All to Indonesia.
Quartz and quartzite	224	125	--	Thailand 100; Sudan 15.
Sand other than metal-bearing	48	223	--	Philippines 177; Japan 20.
Sulfur:				
Elemental, all forms	15	9	--	Mainly to Macau.
Sulfuric acid	26	41	--	China 23; Philippines 7; Indonesia 6; Taiwan 5.
Talc, steatite, soapstone, pyrophyllite	5,302	7,663	--	Indonesia 6,785; Taiwan 767.
Other:				
Crude	212	638	--	Mainly to China.
Slag and dross, not metal-bearing	3,400	--		
Oxides and hydroxides of barium, magnesium, strontium	2	1	--	Mainly to Indonesia.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	23	--		
Carbon: Carbon black and gas carbon	779	786	--	Indonesia 713; Republic of Korea 60.
Coal: All grades including briquets	100	4	--	All to Thailand.
Coke and semicoke	10	546	--	Indonesia 535.
Hydrogen, helium, rare gases --value	$14,532	$607,569	$189,653	Indonesia $258,139; Philippines $116,103.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	25	33	--	Macau 31.
Gasoline do	81	82	--	All to Macau.
Mineral jelly and wax do	37	56	--	Philippines 22; Singapore 15.
Kerosine and jet fuel do	r19	83	--	Japan 64; Macau 18.
Distillate fuel oil do	271	359	--	Japan 203; Macau 152.
Lubricants do	r225	225	1	Indonesia 82; Taiwan 52; Yemen 18.
Residual fuel oil do	869	738	--	Macau 473; China 216.
Unspecified do	r7	5	--	Macau 4.
Tars and other crude chemicals derived from coal, gas, and petroleum	r22	347	--	India 333.

rRevised.
[1]Excludes quantity of tungsten articles valued at $780,655.
[2]Less than 1/2 unit.
[3]Excludes unreported quantity valued at $352,364 in 1980 and $361,352 in 1981.

Table 6.—Hong Kong: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	15,092	11,602	--	All from China.
Oxides and hydroxides	3,079	2,227	22	China 2,071; Japan 92; West Germany 41.
Metal including alloys, all forms	61,780	61,865	4,109	China 20,202; Canada 11,392; Japan 5,300.
Chromium:				
Ore and concentrate	5	5	--	All from Italy.
Oxides and hydroxides	706	431	67	West Germany 180; China 158; United Kingdom 20.
Cobalt: Oxides and hydroxides	18	42	--	United Kingdom 33; China 8.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	20	43	--	All from Japan.
Copper:				
Sulfate	112	282	12	China 130; United Kingdom 99; Australia 34.
Oxides and hydroxides	167	243	(1)	West Germany 128; Norway 69; United Kingdom 36.
Metal including alloys, all forms	47,210	41,712	911	Japan 25,907; China 6,815; Taiwan 3,249.
Gold:				
Waste and sweepings value, thousands	$1,290	$6,638	$23	Papua New Guinea $5,298; Singapore $900; Philippines $325.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,153	3,258	35	United Kingdom 1,901; Switzerland 1,036; Philippines 100.
Iron and steel: Metal:				
Scrap	93,297	94,436	54	China 57,973; Japan 31,091; Macau 3,679.
Pig iron, ferroalloys, related materials	21,205	26,762	367	China 23,562; Australia 1,267; Republic of South Africa 1,012.
Steel, primary forms	156,083	127,018	16,509	Australia 97,981; Taiwan 8,169; China 4,234.
Semimanufactures thousand tons	1,496	1,607	11	Japan 741; China 322; Taiwan 257.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides	308	215	--	China 103; Australia 55; West Germany 39.
Metal including alloys, all forms	2,745	2,042	--	Canada 718; China 470; Australia 201.
Magnesium: Metal including alloys, unwrought	51	67	--	Norway 28; China 20; Canada 12.
Manganese:				
Ore and concentrate	374	--		
Oxides	2,558	1,857	--	China 1,182; Singapore 298; Japan 281.
Mercury 76-pound flasks	2,660	2,870	1	China 2,775; Philippines 56; Spain 20.
Metalloids:				
Arsenic: Oxides and acids	46	74	--	All from China.
Unspecified	34	664	1	China 659.
Nickel:				
Oxides and hydroxides	254	198	--	Canada 175; Netherlands 21.
Metal including alloys, all forms	3,978	5,112	12	Canada 3,942; Norway 627; Japan 206.
Platinum-group metals:				
Waste and sweepings value	--	$27,045	$9,345	Japan $17,700.
Metals including alloys, unwrought and partly wrought troy ounces	49,641	78,705	2,797	United Kingdom 34,369; West Germany 23,406; Switzerland 10,578.
Silver:				
Waste and sweepings value, thousands	$142	$194	--	Philippines $150; Bangladesh $34.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,353	492	17	United Kingdom 123; Switzerland 101; China 80.
Tin: Metal including alloys, all forms	2,065	2,205	57	Malaysia 944; China 929; Singapore 71.
Titanium:				
Ore and concentrate[2]	481	677	--	China 510; Australia 157.
Oxides	5,406	6,246	1,470	Japan 1,350; United Kingdom 1,064; Australia 1,002.
Tungsten:				
Ore and concentrate	425	4,185	--	All from China.
Metal including alloys, all forms	4	5	1	China 2; Japan 1; United Kingdom 1.
Uranium and/or thorium: Oxides and other compounds	6	6	1	France 4; Japan 1.
Zinc:				
Oxides	470	710	21	France 210; West Germany 196; China 157.
Metal including alloys, all forms	29,962	36,104	127	Australia 21,613; China 3,464; Belgium 3,330.
Other:				
Oxides and hydroxides	273	2,035	5	China 2,007.
Ashes and residues	60	5,760	16	China 4,792; Singapore 859; Taiwan 91.
Base metals including alloys, all forms	1,253	12,354	94	Australia 10,917; Malaysia 299; China 253.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,396	1,610	381	Japan 581; China 501; Italy 102.
Artificial: Corundum	305	1,263	57	China 977; Japan 179; West Germany 48.
Dust and powder of precious and semiprecious stones including diamond value	$150,977	$328,303	--	United Kingdom $164,055; Japan $139,120; Belgium $18,071.
Grinding and polishing wheels and stones	2,405	2,326	31	China 1,173; Japan 565; Republic of Korea 201.
Asbestos, crude	8,776	3,297	19	China 3,240.
Barite and witherite	1,169	915	--	China 542; United Kingdom 198; Thailand 108.
Boron materials: Oxides and acids	242	731	207	China 521.
Cement thousand tons	3,220	3,383	22	Japan 1,018; Republic of Korea 809; Taiwan 741.
Clays and clay products:				
Crude	89,499	83,231	1,461	China 62,130; Macau 10,085; Japan 7,696.
Products, nonrefractory and refractory including nonclay brick value, thousands	$63,311	$73,889	$379	China $18,605; Italy $16,173; Japan $13,365.
Cryolite and chiolite	9	60	--	China 28; Denmark 27.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung thousand carats	1,291	1,203	77	India 451; Israel 306; Belgium 162.
Industrial do	145	9	1	Australia 4; Japan 2.
Diatomite and other infusorial earth	364	481	481	
Feldspar, fluorspar, related materials	16,373	14,777	--	China 14,227.
Fertilizer materials:				
Crude, n.e.s	1,020	1,228	38	China 907; New Zealand 99; Canada 86.
Manufactured:				
Nitrogenous	37,066	13,472	36	Japan 5,128; Republic of Korea 4,392; West Germany 2,197.
Unspecified and mixed	8,454	10,275	143	West Germany 7,228; Republic of Korea 1,825; Japan 435.
Graphite, natural	214	640	11	China 576; Sri Lanka 50.
Gypsum and plaster	86,119	71,441	168	Japan 37,459; Republic of Korea 19,850; Australia 10,887.
Lime	29,858	28,843	--	China 27,255; Taiwan 1,573.
Magnesium compounds:				
Magnesite	r8,358	10,478	1	China 8,985; Taiwan 800; Japan 692.
Oxides and hydroxides	135	852	--	Japan 688; West Germany 129.
Mica:				
Crude including splittings and waste	31	33	--	India 31.
Worked including agglomerated splittings	437	624	1	Japan 570; Belgium 38.
Pigments, mineral:				
Natural, crude	475	417	--	China 410.
Iron oxides and hydroxides, processed	997	2,426	79	China 1,315; Japan 751; West Germany 192.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material value, thousands	$97,901	$103,575	$8,715	Singapore $27,459; Zaire $23,188; Thailand $21,440.
Meerschaum, amber, jet	2	(1)	--	All from Denmark.
Synthetic value, thousands	$4,028	$5,715	$960	West Germany $1,436; Republic of Korea $1,428; Japan $1,211.
Salt and brine	73,410	71,234	36	China 55,686; Israel 9,691; Taiwan 2,750.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	316	431	4	China 333; West Germany 61; Japan 20.
Sodium carbonate, natural and manufactured	29,126	22,397	--	East Germany 7,965; France 3,384; Japan 2,458.
Sodium hydroxide	20,284	26,733	106	China 12,971; Republic of Korea 3,519; West Germany 2,544.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,765	4,449	--	China 2,830; Italy 933; Pakistan 410.
Worked	21,699	24,273	3	Italy 17,042; China 4,798; Taiwan 1,014.
Dolomite, chiefly refractory-grade	210	--	--	
Gravel and crushed rock	162,788	357,248	45	China 225,412; Macau 130,150.
Limestone other than dimension	136,634	41,741	20	China 40,346.
Quartz and quartzite	2,475	1,909	--	China 1,770.
Sand other than metal-bearing thousand tons	1,196	904	(1)	China 901.
Sulfur:				
Elemental, all forms	1,213	1,219	210	Japan 406; China 350; West Germany 234.
Sulfuric acid	2,692	3,167	23	China 2,576; Taiwan 390; United Kingdom 97.
Talc, steatite, soapstone, pyrophyllite	7,488	9,607	267	China 9,024.
Other:				
Crude	7,428	6,725	60	China 6,202; Macau 400.
Slag and dross, not metal-bearing	689	1,494	--	China 1,217; Thailand 242.
Oxides and hydroxides of barium, magnesium, strontium	9	8	1	Japan 6.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	18,787	19,967	1,804	Thailand 6,331; United Kingdom 3,585; China 2,317.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	576	209	9	United Kingdom 189.
Carbon: Carbon black and gas carbon	749	1,290	108	China 907; Japan 135.
Coal: All grades including briquets	2,851	57,004	9	China 52,403; Vietnam 3,200.
Coke and semicoke	5,571	4,281	--	Japan 2,520; China 1,322.
Hydrogen, helium, rare gases value, thousands	$263	$543	$347	China $105; Singapore $58.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1,224	1,355	--	Singapore 849; Japan 358; Taiwan 91.
Gasoline ---do---	1,707	2,242	--	Singapore 1,589; China 532; Bahrain 121.
Mineral jelly and wax ---do---	110	110	3	China 93; Japan 12.
Kerosine and jet fuel ---do---	6,752	7,496	1	Singapore 5,531; China 1,562.
Distillate fuel oil ---do---	8,470	9,101	--	China 4,908; Singapore 3,822.
Lubricants ---do---	505	485	27	Singapore 140; Japan 115; China 92.
Residual fuel oil ---do---	27,904	29,013	--	Singapore 23,431; China 2,116.
Bitumen and other residues ---do---	178	193	4	Singapore 110; China 54; Republic of Korea 21.
Unspecified ---do---	40	32	2	China 20; United Kingdom 5.
Tars and other crude chemicals derived from coal, gas, and petroleum	1,672	1,753	45	China 1,613; Netherlands 54.

[r] Revised.
[1] Less than 1/2 unit.
[2] Includes ores and concentrates of vanadium, niobium, etc.

KAMPUCHEA[10]

The mineral industry of Kampuchea continued to consist of local mining operations serving only the needs of local immediate users. The only minerals known to have been produced to any significant extent were salt, phosphate rock, gem stones, and nonmetallic construction materials for cement, brick, and tile manufacture.

Few reliable details were available of the Kampuchean economy or infrastructure owing to the unstable political situation and the continuing military activities connected with the Vietnamese occupying forces. Improvements in the farming sector were reported, and total rice production was increased. This improved production probably necessitated corresponding increases in the production of phosphate rock for fertilizer. In Kampuchea, phosphate rock is simply ground to a fine powder and applied directly to a cropland with no attempt at chemical processing or blending.

Salt was produced by evaporation of seawater in the Districts of Kampot and Kampong Trach for domestic consumption. It was reported that the production level in Kampot was 64% above that of 1981, or about 38,000 tons. The 1983 target for Kampot was 45,000 tons. Neither the actual nor target production was available for the Kampong Trach salt industry.

Gem stones were known to occur along the Thai-Kampuchean border but have not been commercially exploited for several years.

NORTH KOREA[11]

The fundamental principle of North Korea's current 7-year economic plan (1978-84) is self-sufficiency and reliance on domestically produced raw materials as much as practical. North Korea's economy is encumbered by debts to China, the U.S.S.R., and market economy countries, principally Japan. The Government sought to stabilize its debt ceiling through expansion of commodity exports primarily of lead, zinc, magnesite, and cement, in addition to machine tools. Because of contraction of world markets, North Korea's exports were sluggish, further reducing foreign exchange

earnings and necessitating external debt rescheduling. Under the current plan, output targets in 1984 included electricity, 56 to 60 billion kilowatt-hours; coal, 70 to 80 million tons; iron ore, 16 million tons; pig iron, 6.4 to 7 million tons; steel, 7.4 to 8 million tons; nonferrous metals, 1 million tons; and cement, 12 to 13 million tons. By the end of the 1980's, the value of exports was to increase fourfold over shipments at the beginning of the decade.

In 1982, Government revenues were estimated at $24.1 billion, an increase of 10% over that of 1981.[12] Total expenditures increased by 9% to $23.6 billion. However, North Korea's estimated debt was close to five times the budget surplus in 1982.

Kim Chaek Iron and Steel Works, North Korea's largest steel producer, was being expanded. Musan Mine, which produces iron ore for Kim Chaek, was likewise being expanded. Other steelworks undergoing expansion included Hwanghae, Kangson, and Songjin. A new 3-million-ton-per-year steel facility was planned for construction at Taedonggang.

Lead and zinc mine output was also to be increased. Production at the Komdok Mine, North Korea's largest lead-zinc mine, was being increased with the installation of a third ore dressing plant, belt conveyors, and construction of new shafts. A new lead-zinc smelting plant was under construction at Tanchon. Other lead-zinc projects included mine expansion programs at Hyesan, Sangnong, and Unhung.

Table 7.—North Korea: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Principal destinations, 1981
METALS			
Aluminum: Metal including alloys:			
Scrap	7	NA	
Unwrought	73	NA	
Semimanufactures	2,706	NA	
Cadmium: Metal including alloys, all forms	55	52	All to West Germany.
Copper: Metal including alloys:			
Scrap	79	72	All to Japan.
Unwrought	5	NA	
Semimanufactures	5	18	Jordan 15.
Gold: Metal including alloys, unwrought and partly wrought, troy ounces	--	70,176	All to West Germany.
Iron and steel: Metal:			
Scrap	1,727	7,407	Japan 5,307; Indonesia 2,100.
Pig iron, cast iron, related materials	66,018	75,892	Japan 65,892; Egypt 10,000.
Ferroalloys:			
Ferrosilicon	NA	2,636	All to U.S.S.R.
Unspecified	7,118	NA	
Steel, primary forms	82,947	24,991	Thailand 14,681; Indonesia 10,310.
Semimanufactures:			
Bars, rods, angles, shapes, sections	92,256	3,023	Egypt 2,904; Guatemala 119.
Universals, plates, sheets	62,782	7,910	Philippines 6,200; Guatemala 907; Indonesia 626.
Hoop and strip	200	1,500	Indonesia 1,128; France 372.
Rails and accessories	1	NA	
Wire	1,929	294	Guatemala 189; Pakistan 105.
Tubes, pipes, fittings	[2]16,756	297	All to France.
Castings and forgings, rough	180	NA	
Lead:			
Oxides	--	11	All to Japan.
Metal including alloys:			
Unwrought	40,719	12,284	Do.
Semimanufactures	--	297	All to Indonesia.
Molybdenum: Ore and concentrate	--	[3]2	All to Japan.
Silver: Metal including alloys, unwrought and partly wrought, value, thousands	$58,373	$19,952	West Germany $19,331; United Kingdom $484.
Tin: Metal including alloys, semimanufactures	10	NA	
Titanium: Ore and concentrate	--	1	All to Japan.
Tungsten: Metal including alloys, all forms	1	NA	
Zinc:			
Ore and concentrate	54,488	63,985	Japan 50,430; Yugoslavia 13,555.
Oxides	--	(4)	All to Sri Lanka.
Metal including alloys, unwrought	49,247	22,090	Japan 19,308; Yugoslavia 1,120; Egypt 1,000.
Other:			
Ores and concentrates	--	10	All to Sweden.
Oxides and hydroxides	13	NA	
Ashes and residues	4,955	1,066	All to Japan.

See footnotes at end of table.

Table 7.—North Korea: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Principal destinations, 1981
NONMETALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones	42	NA	
Barite and witherite	3,842	NA	
Cement	571,587	305,115	U.S.S.R. 155,000; Qatar 143,000.
Clays and clay products:			
Crude:			
Chamotte earth	189	NA	
Kaolin	20,100	NA	
Unspecified	64	NA	
Products:			
Nonrefractory	136	9	Sweden 7; Austria 2.
Refractory including nonclay brick	(5)	NA	
Diamond: Gem, not set or strung value, thousands	$18	$10	All to Italy.
Feldspar, fluorspar, related materials	7,899	NA	
Fertilizer materials: Manufactured:			
Nitrogenous	26,004	35,608	U.S.S.R. 20,011; Indonesia 10,000; Fiji 5,097.
Phosphatic	--	2,000	All to Fiji.
Potassic	--	5,000	All to Indonesia.
Unspecified and mixed	500	NA	
Graphite, natural	10,684	6,055	Japan 5,755; Austria 300.
Magnesium compounds:			
Magnesite including powder	793,955	612,824	U.S.S.R. 477,915; Japan 121,617; West Germany 11,795.
Other	NA	79,710	Poland 69,588; Yugoslavia 5,000; Spain 2,994.
Mica: Worked including agglomerated splittings	--	3	All to Indonesia.
Precious and semiprecious stones other than diamond:			
Natural value, thousands	$84	$11	All to Italy.
Synthetic do.	$1	NA	
Salt and brine	113	NA	
Sodium and potassium compounds, n.e.s.: Sodium hydroxide	252	NA	
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	9,559	7,984	All to Japan.
Worked	63	(4)	Do.
Dolomite, chiefly refractory-grade	300	NA	
Gravel and crushed rock	192	205	All to Japan.
Quartz and quartzite	1,833	1,644	Do.
Sand other than metal-bearing	2	NA	
Sulfur: Elemental: Crude including native and byproduct	100	250	All to Indonesia.
Talc, steatite, soapstone, pyrophyllite	45,210	30,304	Japan 26,371; Poland 3,883.
Other:			
Crude	3,500	50	All to Japan.
Slag and dross, not metal-bearing	5	NA	
MINERAL FUELS AND RELATED MATERIALS			
Carbon: Carbon black	--	90	Indonesia 70; Thailand 20.
Coal: Anthracite and bituminous	100,233	NA	
Petroleum refinery products:			
Lubricants 42-gallon barrels	1,274	1,260	All to Indonesia.
Residual fuel oil do.	130,389	NA	
Tars and other crude chemicals derived from coal, gas, and petroleum	602	2,706	Italy 2,098; Japan 569; Indonesia 34.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

[2]Excludes part of Canadian imports valued at $137,000.

[3]Excludes imports by Sweden valued at $80,000.

[4]Less than 1/2 unit.

[5]Reported value of imports by Malta was $33,000.

Table 8.—North Korea: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Principal sources, 1981
METALS			
Aluminum:			
Oxides and hydroxides	11	10	All from Japan.
Metal including alloys:			
Unwrought	2,158	252	All from Spain.
Semimanufactures	704	4,711	Japan 4,516; West Germany 78; Belgium-Luxembourg 66.
Chromium:			
Ore and concentrate	19,426	14,000	All from U.S.S.R.
Oxides and hydroxides	37	150	All from Japan.
Cobalt:			
Oxides and hydroxides	1	1	Do.
Metal including alloys, all forms	4	NA	
Columbium and tantalum: Metal including alloys, tantalum kilograms	5	516	All from Japan.
Copper:			
Ore and concentrate	7,702	6,298	All from Philippines.
Metal including alloys:			
Scrap	--	243	All from Japan.
Semimanufactures	59	73	Japan 72.
Iron and steel:			
Iron ore and concentrate excluding roasted pyrite	111,246	NA	
Metal:			
Pig iron, cast iron, related materials	11,011	153	All from Sweden.
Ferroalloys:			
Ferromanganese	NA	16,549	All from Japan.
Unspecified	11,505	2,079	Japan 2,069.
Steel, primary forms	65	376	All from Japan.
Semimanufactures:			
Bars, rods, angles, shapes, sections	[2]15,310	17,260	Italy 15,774; Japan 1,376.
Universals, plates, sheets	17,733	[3]18,280	Japan 16,929; France 499; Belgium-Luxembourg 495.
Hoop and strip	[4]148	315	West Germany 168; Japan 147.
Rails and accessories	4,956	3,965	All from Japan.
Wire[5]	100	559	Japan 558.
Tubes, pipes, fittings	10,521	[6]10,205	Japan 9,421; West Germany 679.
Lead:			
Ore and concentrate	--	2,023	All from Japan.
Metal including alloys:			
Unwrought	[7]50	NA	
Semimanufactures	4	NA	
Magnesium: Metal including alloys:			
Unwrought	30	NA	
Semimanufactures	--	2	All from West Germany.
Manganese:			
Ore and concentrate, metallurgical-grade	29,100	15,000	All from U.S.S.R.
Oxides	350	NA	
Metalloids:			
Phosphorus	NA	10	All from Japan.
Unspecified	7	NA	
Molybdenum:			
Ore and concentrate	43	NA	
Metal including alloys, all forms kilograms	284	350	All from Japan.
Nickel: Metal including alloys:			
Unwrought	--	377	Japan 213; Finland 164.
Semimanufactures	3	1	All from West Germany.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$233	NA	
Silver:			
Ore and concentrate do	--	$539	All from Philippines.
Metal including alloys, unwrought and partly wrought do	$34	NA	
Tin:			
Oxides	--	1	All from Japan.
Metal including alloys:			
Unwrought	52	NA	
Semimanufactures	5	NA	
Titanium:			
Oxides	52	144	All from Italy.
Metal including alloys, all forms	6	5	All from Japan.
Tungsten: Metal including alloys, all forms	40	([8])	Do.
Vanadium: Ore and concentrate	45	NA	
Zinc:			
Ore and concentrate[7]	9,661	9,051	All from Peru.
Oxides	1	NA	
Metal including alloys:			
Unwrought	--	[7]164	All from Australia.
Semimanufactures	141	NA	

See footnotes at end of table.

Table 8.—North Korea: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Principal sources, 1981
METALS —Continued			
Other:			
Oxides and hydroxides	34	8	Belgium-Luxembourg 4; Japan 4.
Base metals including alloys, all forms	10	2	Austria 1; Japan 1.
NONMETALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc. value, thousands	--	$2	All from Austria.
Dust and powder of precious and semiprecious stones excluding diamond do	$20	$15	All from Japan.
Grinding and polishing wheels and stones	12	24	Do.
Boron materials: Oxides and acids	19	37	Italy 36.
Cement	--	150	All from Japan.
Clays and clay products:			
Crude	--	5	All from France.
Products:			
Nonrefractory[9]	60	144	Japan 88; Italy 41; West Germany 11.
Refractory including nonclay brick	4,137	1,463	Japan 1,271; Denmark 188.
Diatomite and other infusorial earth	2	56	All from Denmark.
Fertilizer materials: Manufactured:			
Ammonia	6	600	All from Japan.
Potassic	82,901	81,543	U.S.S.R. 77,543; Japan 4,000.
Unspecified and mixed	2	([8])	All from Japan.
Gypsum and plaster	--	8,760	Thailand 8,755.
Halogens	5	NA	
Mica:			
Crude including splittings and waste	3	6	All from Japan.
Worked including agglomerated splittings	2	NA	
Phosphates, crude	80,000	NA	
Precious and semiprecious stones other than diamond:			
Natural value, thousands	$6	NA	
Synthetic do	$12	NA	
Salt and brine	21,113	198	All from Japan.
Sodium and potassium compounds, n.e.s:			
Potassium hydroxide including sodic and potassic peroxides	1	18	All from France.
Sodium carbonate, natural and manufactured	([8])	1	All from Japan.
Sodium hydroxide	3	NA	
Stone, sand and gravel:			
Dimension stone, worked	211	NA	
Gravel and crushed rock	37	NA	
Sulfur:			
Elemental:			
Crude including native and byproduct	22,975	243,164	Canada 221,164; Poland 22,000.
Colloidal, precipitated, sublimed	2,420	NA	
Dioxide	--	2	All from Japan.
Sulfuric acid	6	NA	
Other: Crude	87	3	All from Japan.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	1	NA	
Carbon: Carbon black	2,452	NA	
Coke and semicoke	246,181	176,417	Japan 110,417; Poland 66,000.
Hydrogen, helium, rare gases	4	1	All from Japan.
Petroleum refinery products:			
Liquefied petroleum gas 42-gallon barrels	--	12	All from Italy.
Gasoline do	--	151	All from Japan.
Mineral jelly and wax do	1,865	236	Do.
Kerosine and jet fuel do	729	247	Yugoslavia 209; Japan 38.
Distillate fuel oil do	89,595	NA	
Lubricants do	[10]13,062	2,463	Japan 2,442.
Nonlubricating oils do	133	NA	
Residual fuel oil do	4,156	NA	
Bitumen and other residues do	91	61	All from Japan.
Bituminous mixtures do	970	1,612	Do.
Unspecified do	--	1,315	Do.
Tars and other crude chemicals derived from coal, gas, and petroleum	100	NA	

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Excludes part of Japanese exports valued at $289,000.

[3]Excludes part of Japanese exports valued at $14,000.

[4]Excludes part of Japanese exports valued at $168,000.

[5]Excludes part of Japanese exports valued at $516,000 in 1980 and $14,000 in 1981.

[6]Excludes part of Japanese exports valued at $34,000.

[7]Metallgesellschaft Aktiengesellschaft (Metal statistics), Frankfurt am Main, Federal Republic of Germany.

[8]Less than 1/2 unit.

[9]Excludes exports from Japan valued at $184,000 in 1980 and $53,000 in 1981.

[10]Excludes part of Japanese exports valued at $1,149,000.

LAOS[13]

During 1982, the second year in Laos' current 5-year plan, the Prime Minister was able to report "modest economic success." The progress was largely in the agricultural sector because Lao society is "a small farmer's natural economy of self-sufficiency and self-support."[14] The socialist idea of collective production has met with little understanding and thus little real success in this landlocked country of 3.5 million people. The mineral wealth remained untapped largely owing to the continuing lack of infrastructure needed for its development. A lack of investment capital and technical expertise also contribute to the underutilization of mineral commodities.

Laos has known deposits of tin, iron ore, salt, potash, gem stones, gypsum, and coal. The Soviet Union was completing surveys of these mineral resources and was expected to publish its findings in the next 2 years.

Most electricity produced in Laos is from the hydroelectric plant expanded in 1981 at the Nam Ngum Dam. Officials of the Lao State Electricity Enterprise stated that nearly 800 million kilowatt-hours were generated there during 1982. About one-eighth of this amount was used domestically, the rest exported to Thailand for foreign exchange. During 1982, electric service was expanding into some new rural areas. Electrification was especially important for economic expansion, standard of living, and development of the mining and manufacturing sectors.

COMMODITY REVIEW

The survey and exploration of the tin resources in the Pa Then Basin, being carried out with assistance of the Soviet Union, apparently neared completion during the year. Once a significant producer of tin, Laos nationalized the French-owned Phonteou Mines in 1978 and has been attempting to reach former production levels ever since. During 1982, the project was reported to be in the "machinery restoration stage" with 80% of the entire plan completed. Conflicting and fragmentary Lao press reports make estimating tin production nearly impossible. It was believed that 77 tons of tin concentrate was exported in the first 6 months of 1982. Another report stated that production increased by 30% over that of 1981.[15]

The largest identified mineral resource in Laos was iron ore, occurring in Siang Khoang Province near Phonlek and Lalbouak. In 1982, Vietnam was assisting Laos in the exploration of this resource, which is known to contain several hundred million tons of high-grade magnetite.

At yearend, the Lao and Vietnamese Ministries of Construction signed an agreement for the construction of a cement factory. No location or size was given.

Gypsum was becoming an important product in the Lao mining sector. A memorandum on construction of gypsum mines in Donghen, Savannakhet Province, was signed between Laos and Vietnam. The output will probably be exported to Vietnam, which is expanding its cement industry. Production continued to increase and may have exceeded 50,000 tons by yearend.

Two new brickworks were operating after being constructed in cooperation with the Vietnamese. The largest, in Vientiane, completed its first full year of operation and the other, in Saravane Province, began operating in mid-1982. Other quarries or plants producing common construction materials were small and produced only enough for local use.

Soviet and Lao geologists prospecting for mineral deposits in Laos, discovered five new coal deposits up to 45 meters thick. This coal was reportedly planned for use as fuel for the construction materials industry in the Bochan region.

The construction of the 500-kilometer-long, petroleum products pipeline between Vientiane and Vinh City in Vietnam continued in the surveying stage. This major project of the 5-year plan was being carried out with Soviet assistance and was to have a capacity of 300,000 tons per year. At the current rate of progress, it will be completed in several years.

Table 9.—Laos: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Destinations, 1981	
			United States	Other (principal)
Aluminum: Metal including alloys, scrap	34	NA		
Copper: Metal including alloys, scrap	21	6	--	All to Thailand.
Diamond: Gem, not set or strung value, thousands	$111	$449	$449	
Iron and steel: Metal:				
Ferroalloys	9	NA		
Semimanufactures:				
Bars, rods, angles, shapes, sections	10,549	NA		
Universals, plates, sheets	2	NA		
Tubes, pipes, fittings	941	NA		
Silver:				
Ore and concentrate value, thousands	--	$7	--	All to Canada.
Metal including alloys, unwrought and partly wrought, troy ounces	--	161	--	All to Thailand.
Tin: Ore and concentrate	122	NA		

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Laos, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

Table 10.—Laos: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	19	3	--	All from Thailand.
Copper: Metal including alloys, semimanufactures	24	1	--	All from Netherlands.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	--	(2)	--	All from Japan.
Ferroalloys	10	NA		
Steel, primary forms	--	1	--	All from Thailand.
Semimanufactures:				
Bars, rods, angles, shapes, sections	559	153	1	Thailand 134; Japan 18.
Universals, plates, sheets	3,795	1,352	--	Netherlands 1,236; Japan 18.
Wire	99	16	--	Thailand 15.
Tubes, pipes, fittings	289	355	--	Thailand 354.
Castings and forgings, rough	26	17	--	United Kingdom 16.
Lead: Metal including alloys:				
Unwrought	--	4	--	All from Thailand.
Semimanufactures	--	12	--	Japan 9; Thailand 3.
Zinc: Metal including alloys:				
Unwrought	--	350	--	All from Japan.
Semimanufactures	852	363	--	All from Thailand.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	61	--	Do.
Grinding and polishing wheels and stones	29	19	--	Thailand 12; Italy 7.
Cement	3,593	3,999	--	Philippines 2,600; Thailand 1,302.
Chalk kilograms	--	135	--	All from Japan.
Clays and clay products:				
Crude, unspecified do	--	50	--	All from Thailand.
Products:				
Nonrefractory	338	97	--	Do.
Refractory including nonclay brick	--	17	--	Japan 15; Thailand 2.
Fertilizer materials:				
Crude, n.e.s	--	1	--	All from Thailand.
Manufactured:				
Ammonia	3	33	--	Do.
Nitrogenous	393	2,498	--	U.S.S.R. 2,488.
Phosphatic	364	(2)	--	All from Thailand.
Potassic	--	20	--	Do.
Unspecified and mixed	254	87	--	Japan 86.

See footnotes at end of table.

Table 10.—Laos: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Gypsum and plaster ____ kilograms	--	330	--	All from Thailand.
Mica: Crude including splittings and waste ____ do	--	3	--	All from Japan.
Salt and brine ____ value, thousands	$143	NA		
Sodium and potassium compounds, n.e.s.:				
Sodium carbonate, natural and manufactured	1	NA		
Sodium hydroxide	54	NA		
Sodium sulfate, natural and manufactured	--	107	--	All from Thailand.
Stone, sand and gravel:				
Dimension stone, worked	12	21	--	All from Italy.
Gravel and crushed rock	40	18	--	All from Thailand.
Limestone other than dimension	13	22	--	Do.
Sulfur:				
Elemental:				
Crude including native and by-product	1	NA		
Colloidal, precipitated, sublimed kilograms	325	NA		
Sulfuric acid	65	40	--	All from Netherlands.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	2	12	--	All from Thailand.
Hydrogen, helium, rare gases	--	3	--	Do.
Petroleum refinery products:				
Gasoline ____ 42-gallon barrels	157,386	NA		
Mineral jelly and wax ____ do	488	1	--	All from Thailand.
Kerosine and jet fuel ____ do	32,488	484,590	--	Thailand 484,584.
Distillate fuel oil ____ do	111,900	NA		
Lubricants ____ do	15,792	[3]61	--	Netherlands 21; Thailand 21; Japan [3]19.
Nonlubricating oils ____ do	1,064	NA		
Bitumen and other residues ____ do	6,060	NA		
Bituminous mixtures ____ do	1,212	NA		
Unspecified ____ do	--	19	--	All from Japan.
Tars and other crude chemicals derived from coal, gas, and petroleum kilograms	--	18	--	Do.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Laos, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

[2]Less than 1/2 unit.

[3]Excludes part of Japanese exports valued at $6,000.

MONGOLIA[16]

Mongolia's gross national product, as measured by an aggregate social product, grew 7.6% in 1982 compared with 8.3% in 1981.[17] According to the Central Statistical Bureau of the Mongolian People's Republic, the national income increased by 7.4% in 1982 compared with 7.9% in 1981. An increase in labor productivity contributed mostly to the nation's economic growth in 1981-82. The total value of industrial production was estimated at $1.57 billion[18] in 1982 compared with $1.45 billion in 1981.

Capital investment in 1982, under the seventh 5-year plan, totaled $1.25 billion. About 40% was for industrial development of the fuel and power, mining, and construction industries, and 17% was for the development of nine state farms and other agricultural projects. The total value of industrial and construction projects completed during the year was $800 million. Under the seventh 5-year plan, the Government will spend about $1.45 billion for economic development projects in 1983.

After the sixth 5-year plan (1976-80), the structure of Mongolian export commodities has changed from agricultural materials such as meat and wool to industrial raw materials and consumer goods. In 1982, the major export commodities included finished leather, fur items, rugs, blankets, copper, fluorspar, lumber, and other industrial base products. Mongolian exports reportedly rose 18.7%. Because of the emphasis on the development of industrial projects under the seventh 5-year plan, imports of capital

goods increased substantially in 1981-82. The principal import items included powerplants, machinery, and equipment. Imports of consumer goods reportedly also increased in 1982, especially household electrical appliances and food products. The U.S.S.R. remained the major buyer of Mongolian exports and the dominant supplier of Mongolian imports.

COMMODITY REVIEW

Metals.—Production of copper and molybdenum at the Erdenet Mine increased. The ore deposit and the open pit mining operations were at Mount Erdenetiyn-ovoo, which is about 1,000 meters above sea level, stretches 25 kilometers from southeast to northeast, and is 1.5 to 3 kilometers wide. The ore scooped up by the excavator was dumped into the 27-ton tip trucks, then transported to a conveyor, which carries the ore to the crushing mill. The water used in the flotation plant is piped from the Selenge River, about 50 kilometers away. The electric power is supplied by high-tension line from Gusinoozersk, U.S.S.R. The concentrate produced at the mill contains 33% copper and was exported by rail to Ural, U.S.S.R., for smelting. In 1982, export earnings of copper and molybdenum concentrates from the Erdenet Combine accounted for over one-third of Mongolian total export earnings.[19]

Nonmetals.—A new cement and lime complex reportedly was under construction at Hotol (Belendalay) in northern Mongolia. The limestone deposit at Hotol will be mined by an open pit operation to provide the raw material to the cement plant nearby as well as to supply the existing Darhan cement plant. The Hotol cement complex will have an annual capacity of 500,000 tons of cement and 65,000 tons of lime when construction is completed in 1983 or 1984.

Development of the rich Fluorite Belt in the eastern Gobi Desert was well underway in 1982. The development of an open pit fluorspar mine and the construction of a new ore-dressing plant at Bor-ondor were undertaken by the joint Mongolian-Soviet amalgamation Mongolsovtsvetment. Fluorite production from Berh and two other small mines reportedly increased 12%. The output was valued at $3 million and accounted for 40% of the total value of Mongolian mineral production. Most output from Berh was exported to the U.S.S.R.

Mineral Fuels.—Mongolian coal production capacity reportedly reached 4.8 million tons per year. The coal industry has 10% of all industrial workers and its output value was about 14% of Mongolian industrial production. The Nalayh-Kapital'naya Mine, the leading coal producer in Mongolia, provided most of the fuel (electricity) requirements of the Ulan Bator area. After the renovation and modernization, the coal output increased substantially in 1982.

Coal development at Baga-Nuur, near Kherulen River, was undertaken by Mongolian and Soviet workers in 1982. Under the plan, the output capacity was projected to be 1 million tons per year in 1983.[20]

Table 11.—Mongolia: Apparent exports of mineral commodities[1]

(Metric tons)

Commodity	1980	1981[p]	Principal destinations, 1981
Cement	[2]6,800	[2]700	All to U.S.S.R.
Iron and steel: Metal:			
Scrap	20,007	21,400	Do.
Semimanufactures:			
Tubes, pipes, fittings	1	NA	
Castings and forgings, rough	2	NA	
Other metals: Ashes and residues	--	52	All to Japan.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Mongolia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

Table 12.—Mongolia: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Sources, 1981	
			United States	Other (principal)
METALS				
Copper: Metal including alloys, semimanufactures value, thousands	--	$8	--	All from Japan.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	2,100	2,200	--	NA.
Semimanufactures:				
Tubes, pipes, fittings	8,600	10,100	--	NA.
Unspecified	38,400	48,300	--	NA.
Tungsten: Metal including alloys, all forms value, thousands	--	$8	$8	
NONMETALS				
Cement[2]	36,400	112,000	--	NA.
Clays and clay products: Products:				
Nonrefractory	248	63	--	All from Italy.
Refractory including nonclay brick	--	3,512	--	All from U.S.S.R.
Fertilizer materials: Manufactured:[2]				
Nitrogenous, N content	13,400	35,900	--	Mainly from U.S.S.R.
Phosphatic, P_2O_5 content	37,200	26,300	--	All from U.S.S.R.
Precious and semiprecious stones other than diamond: Natural value, thousands	$1	NA		
Salt and brine	2,094	2,455	--	All from U.S.S.R.
Sodium and potassium compounds, n.e.s.:[2]				
Sodium carbonate, natural and manufactured	100	900	--	NA.
Sodium hydroxide	1,000	2,000	--	NA.
Stone, sand and gravel: Dimension stone:				
Crude and partly worked	--	34	--	All from Italy.
Worked	18	17	--	Do.
Sulfur: Sulfuric acid[2]	1,300	1,200	--	All from U.S.S.R.
MINERAL FUELS AND RELATED MATERIALS				
Coal: Anthracite and bituminous[2]	--	34,400	--	NA.
Petroleum refinery products:[2]				
Lubricants thousand 42-gallon barrels	160	154	--	NA.
Unspecified do.	4,428	4,518	--	NA.
Tars and other crude chemicals derived from coal, gas, and petroleum	608	1,024	--	All from U.S.S.R.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Mongolia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

NEPAL[21]

In Nepal, the contribution of the mineral industry toward the total economy was insignificant. The potential for greatly increased mineral production was considerable, however, as very little of the upland regions has been explored for mineral occurrences by any but the most primitive methods. High-grade copper veins have been mined by hand since ancient times, but no detailed evaluation of the potential has ever been made.

The best prospects for development in the immediate future are zinc, magnesite, cement raw materials, and, optimistically, petroleum.

The main hindrance to industrial development was that 95% of the population was dependent on subsistence farming for its livelihood. This form of economy generates little cash flow and less capital accumulation for investment. Any major mineral development, therefore, requires foreign funding in the form of grants or low-interest loans.

Foreign aid continued to play a critical role in financing the country's development plans and in covering budgetary deficits. Disbursement of foreign aid almost doubled to an estimated $245 million, an important development that demonstrates an increasing ability of Nepal to absorb and quickly utilize foreign assistance. Faster disbursement should help speed development projects and encourage greater aid contribu-

tions from foreign donors.

To improve industrial development and to concentrate its financial resources in other development areas, the Government has put top priority on encouraging the growth of the private sector. There remains an acute shortage of capital, management, and technology that the Government hopes to meet by attracting foreign investors. Nepal passed a new investment law designed to encourage private development and to attract domestic and foreign investment through tax holidays and a variety of other incentives.

As in other developing countries, the consumption of energy in Nepal was growing fast. Of the total energy consumed in the country, over 85% was provided by fuelwood, 6% by petroleum products, 1% by hydropower, and the rest from other sources. Overcutting of timber resources to meet these energy needs has resulted in serious environmental problems and caused the Government to look increasingly to other fuel sources, especially its vast hydroelectric potential. Because of the high capital cost of harnessing this potential and the still limited domestic market for large blocks of power, hydroelectric development has been limited.

The power situation in the Kathmandu area has improved because the 60,000-kilowatt Kulekhani hydroelectric plant was brought online in March for testing and trial operation. Power was furnished most of the year from at least one of the two 30,000-kilowatt generators. In December, the King formally dedicated the $120 million project, which was begun in 1977. A 114-meter-high rockfill dam impounds a reservoir that will store some of the monsoon runoff for low-water periods. Most of the other hydroelectric plants in Nepal are run-of-the-river type and have little or no capacity to store the huge volume of runoff.

Four major hydroelectric projects were under consideration. They would require large amounts of foreign assistance and close cooperation with India, which was expected to be the major consumer of the power generated.

Imports increased 12% in fiscal year 1981 to $375 million,[22] whereas exports declined 7% to $113 million. The value of mineral exports was insignificant to the economy in 1982. A small amount of beryl, garnet, and magnesite was exported, but the tonnages and values were not available.[23]

COMMODITY REVIEW

Progress was made in the infrastructure development that will support the zinc mine at Lari in Ganesh Himal, 58 kilometers north-northwest of Kathmandu. Plans have been revised to begin mining in 1985. According to Nepal Metal Co. Ltd., the mining program is predicated on the completion by 1984 of the 105-kilometer road between Trisuli and Somtang (also referred to as Somdang) and the completion of an electric power transmission line into Somtang. The mine is to be located at an elevation of 4,419 meters. The high-grade ore will be processed into concentrate at Somtang, 5 kilometers south and 1,219 meters lower in elevation. This will be the first modern metal mine in Nepal and will employ about 700 people in mining, transporting, and concentrating the ore. The concentrate will be exported.

Though small by world standards, about 25,000 tons per year of concentrate, the project will be a major industry in an area previously inaccessible by motorized vehicles. The road will open the area also to trade, tourism, and development of forest resources and agriculture.

Cement continued to be in short supply in Nepal throughout 1982. The only domestic source was the Himal Cement Co. Ltd. facility in the southern environs of Kathmandu. The plant has a nominal capacity of 160 tons per day but seldom produces at that rate for any sustained period. Maintenance problems, poor quality of raw materials, and an erratic electric power supply have contributed to the low production. Its present production furnishes 15% to 20% of current demand. The remainder is imported from overseas or India. Despite the low production, the value of cement output probably exceeded the combined total of all other mineral production in Nepal.

To improve the situation, a $4.9 million rehabilitation and expansion program got underway at the plant. The 2-year project will raise the capacity to 400 tons per day and provide a captive electric power supply to prevent the problems caused by the frequent power cuts.

A second cement plant has been under construction at Hetauda since 1978. Work on the 750-ton-per-day, dry-process, rotary kiln plant has progressed with glacial slowness. The Asian Development Bank was considering financing $20 million to cover

part of the cost overruns incurred during construction. Tender notices for important components were still appearing in the local Nepalese press at yearend, therefore no realistic completion date can be estimated. The plant was originally designed to make Nepal self-sufficient in cement, but the long construction delays coupled with a steady rise in demand put this goal in some question.

There have been plans for a 1,500-ton-per-day cement plant in Udaypur in southeastern Nepal since 1978. The plant would be a joint Indian-Nepalese undertaking. An Indian team from Cement Corp. of India Ltd. visited Kathmandu in November 1982 to update the previously completed feasibility report on the project. His Majesty's Government will review the new report and decide on what course of action to pursue.

In April, blasting began for overburden removal at the Kharidhunga magnesite deposit, 87 kilometers northeast of Kathmandu. Exploitation of this deposit has been planned for a number of years, but problems with financing, marketing, and infrastructure have slowed the development process.

A small-scale manual mining operation has been underway at a magnesite outcrop. The Government was permitting the export of up to 10,000 tons of this raw magnesite to India for chemical and beneficiation tests and exploration of market prospects.

An agreement was signed in September for a deutsche mark 14.5 million loan from the International Finance Corp. (IFC) to the Nepal Orind Magnesite Private Ltd. company to cover about 25% of the estimated cost of the project. Orissa Industries Private Ltd. of India and His Majesty's Government would each contribute 15%. The balance was to be met by a number of Nepalese and Indian banks and financial institutions.

The Kharidhunga Mine will be designed to produce 125,000 tons of magnesite and 10,000 tons of talc per year. A concentration plant and kiln will be built at Lamosangu in Sindhupalchok District. The Lamosangu plant will produce 50,000 tons per year of dead-burnt magnesite. The talc will be processed at the company's grinding plant at Lamosangu, which has already started production. The project will employ about 700 people and will be an important foreign exchange earner.

The original plans called for a 20,000-ton-per-year refractory brick plant at Birganj, which would use part of the output of the Lamosangu plant. The IFC, however, was reported to have advised against the Birganj plant because India produced a surplus of refractory brick and the plant would not have a wide enough range of products to compete in the international market. Also, the high cost of transporting the brick through India for overseas export would make them noncompetitive.

A coal seam was reportedly found in Dhanusha District near Hariharpur village. A license for further exploration was granted to an individual following tests by the Department of Mines and Geology.

Some deposits of lignite were being mined in the Kathmandu Valley. The lignite was used locally to fire brick kilns, giving the operators a considerable economic advantage over the kilns in the Terai area, which are fueled with much more expensive imported coal.

The Government was encouraging private sector entrepreneurs to develop the lignite deposits. It was also offering technical mining assistance.

Nepal has no crude oil production and no petroleum refining capability. The cost of imported petroleum products was a major drain on its limited foreign exchange reserves, and the Government was anxious to determine if any domestic supplies could be located.

The Government had an aeromagnetic survey flown in 1980 over the Terai and Thure Ranges that indicated evidence of geologic structures capable of trapping oil and gas. In June 1982, the Government procured a $9.2 million credit with the International Development Association (IDA) to run an 800-line-kilometer seismic survey in the Terai Basin. This work was to start in October and would be the first seismic work ever done in Nepal for oil exploration. If the findings are encouraging, the Government will open blocks to private companies for detailed seismic work and exploration drilling.

Part of the IDA loan will be used for legal consultants to draft relevant legislation and recommend terms and conditions of the contract with the private companies in the future. The consultants will also train members of the Department of Mines and Geology in geophysics and the legal aspects of the petroleum industry.

SINGAPORE[24]

In 1982, the value of total industrial output in Singapore was estimated at $16.9 billion.[25] Mining activity was limited to granite quarrying with an output value of $84 million. The output of cement and concrete products was valued at $137 million compared with nonmetallic mineral products, $50 million; iron and steel, $184 million; and nonferrous metals, $60 million. Petroleum refining by far dominated the country's economy. The value of refinery output was $6.7 billion or close to 40% of the value of total industrial production.[26]

Commodity imports totaled $28.2 billion compared with exports of $20.8 billion. Singapore's major trading partners were Malaysia with trade valued at $7.4 billion, followed by Japan, $7.3 billion, and the United States, $6.2 billion. Imports of crude oil and petroleum products were valued at $9.6 billion or 34% of all commodity receipts. Fifty-seven percent of all imported crude oil was from Saudi Arabia. Principal exports were petroleum products, $6.7 billion; machinery, $2.6 billion; and telecommunications equipment, $1 billion.

Table 13.—Singapore: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Alkaline and alkaline-earth metals, kilograms	12,161	2,972	NA	NA.
Rare-earth metals, do	1,854	2,044	NA	NA.
Aluminum:				
Ore and concentrate	6	4	4	
Oxides and hydroxides	1,789	2,421	15	Malaysia 2,364.
Metal including alloys:				
Scrap	6,438	6,196	20	Japan 4,827; Taiwan 535; Pakistan 454.
Unwrought and semimanufactures	8,371	7,440	1	Malaysia 4,218; Hong Kong 1,005; North Korea 426.
Antimony: Metal including alloys, all forms	36	26	--	Malaysia 20.
Bismuth: Metal including alloys, all forms, kilograms	11	16	NA	NA.
Cadmium: Metal including alloys, all forms, do	1,000	1,000	NA	NA.
Chromium:				
Oxides and hydroxides	34	46	--	Malaysia 34; Philippines 10.
Metal including alloys, all forms, kilograms	120	1	NA	NA.
Cobalt:				
Oxides and hydroxides	1	2	--	All to Malaysia.
Metal including alloys, unwrought	7	(1)	NA	NA.
Copper:				
Ore and concentrate	1	NA		
Matte and speiss including cement copper	--	64	--	India 33; Japan 31.
Metal including alloys:				
Scrap	13,865	13,849	10	India 8,898; Japan 2,177; Taiwan 960.
Unwrought and semimanufactures	6,733	8,475	--	Malaysia 7,333; India 338; Taiwan 173.
Iron and steel: Metal:				
Scrap	5,475	1,602	--	Japan 1,170; Malaysia 171; Netherlands 138.
Pig iron, cast iron, related materials	9,951	9,012	--	Malaysia 7,971; India 767; Australia 67.
Steel, primary forms	6,784	10,520	--	Malaysia 10,451.
Semimanufactures:				
Bars, rods, angles, shapes, sections	132,912	109,077	21	Malaysia 70,236; Brunei 11,874; India 10,198.
Universals, plates, sheets	120,490	129,750	--	Malaysia 97,832; Iran 13,155; Taiwan 6,321.
Hoop and strip	2,463	3,374	--	Malaysia 1,942; Iran 500; Australia 328.
Rails and accessories	6,621	5,364	--	Malaysia 5,196.
Wire	5,666	5,147	--	Malaysia 3,589; Brunei 831; Burma 316.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Tubes, pipes, fittings	98,066	151,337	6,208	Brunei 46,857; Malaysia 25,325; India 13,533.
Castings and forgings, rough	651	1,924	370	France 1,042; Netherlands 220; Japan 55.
Lead:				
Ore and concentrate	123	5,000	--	All to North Korea.
Oxides	479	227	--	Malaysia 140; Pakistan 67.
Metal including alloys:				
Scrap	2,256	3,524	--	Taiwan 2,333; India 819; Malaysia 140.
Unwrought and semimanufactures	2,223	962	22	Malaysia 389; Philippines 190; India 176.
Magnesium: Metal including alloys, unwrought kilograms	4,468	13,466	--	All to Malaysia.
Manganese:				
Ore and concentrate, battery-grade	32,788	27,203	--	India 4,886; Republic of Korea 3,158; Thailand 2,995.
Oxides	969	1,287	--	Malaysia 1,055; Egypt 120; North Korea 100.
Mercury 76-pound flasks	68	398	--	Japan 200; Republic of Korea 174.
Metalloids	9	22	--	Malaysia 21.
Nickel:				
Ore and concentrate	5	3	NA	NA.
Metal including alloys:				
Scrap	561	503	45	Japan 344; Taiwan 111.
Unwrought and semimanufactures	1,443	1,320	--	India 1,219; Malaysia 75.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	322	2,283	--	Hong Kong 2,090.
Silver:				
Waste and sweepings[2] value, thousands	$3,280	$1,224	$621	Japan $460; Australia $105.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,065	275	37	Malaysia 57; United Kingdom 56; Australia 43.
Tin:				
Ore and concentrate	5,351	3,318	--	Spain 1,647; Mexico 820; U.S.S.R. 396.
Oxides kilograms	907	2,687	NA	NA.
Metal including alloys:				
Scrap	139	440	6	Japan 168; Taiwan 133; United Kingdom 109.
Unwrought and semimanufactures	14,830	16,244	7,604	Netherlands 3,575; U.S.S.R. 654; Japan 600.
Titanium:				
Ore and concentrate	59	25	NA	NA.
Oxides	542	553	--	Malaysia 546.
Metal including alloys, all forms kilograms	14	--		
Tungsten:				
Ore and concentrate	849	971	215	North Korea 277; West Germany 215; India 165.
Metal including alloys, all forms	119	173	58	North Korea 102.
Zinc:				
Ore and concentrate value	$2,335	(1)	NA	NA.
Oxides	1,602	1,324	--	Japan 1,013; Australia 122; Pakistan 73.
Metal including alloys:				
Scrap	1,281	1,344	--	Taiwan 637; Japan 432; India 212.
Unwrought and semimanufactures	5,031	5,005	50	Malaysia 3,847; India 353; Thailand 236.
Other:				
Oxides and hydroxides	128	294	--	Malaysia 106; Brunei 100.
Ashes and residues	31,761	37,517	--	Brunei 17,582; Malaysia 13,744; Hong Kong 1,207.
Pyrophoric alloys	6	12	--	Maldives 4; Kampuchea 2; Thailand 2.
Base metals including alloys, all forms	10	3	--	All to West Germany.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	60	47	--	Malaysia 8; Hong Kong 4.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Abrasives, n.e.s. —Continued				
Artificial: Corundum ... kilograms	136	2,512	NA	NA.
Dust and powder of precious and semiprecious stones including diamond ... value	$11,209	--		
Grinding and polishing wheels and stones[3]	374	358	1	Malaysia 301; Brunei 20.
Asbestos, crude	10,461	11,603	--	Malaysia 11,485; Philippines 60; United Arab Emirates 34.
Boron materials:				
Crude natural borates	657	734	--	All to Malaysia.
Oxides and acids	204	213	--	Malaysia 81; North Korea 74; Australia 36.
Cement	466,982	472,667	--	Malaysia 419,419; Australia 10,719.
Chalk	2,104	1,594	--	Brunei 1,385; Malaysia 194.
Clays and clay products:				
Crude:				
Bentonite	25,596	29,853	126	Philippines 9,553; Malaysia 5,791; United Arab Emirates 4,109.
Fuller's earth	9,335	9,266	--	Malaysia 9,239.
Kaolin	1,941	1,840	--	Malaysia 1,765; Vietnam 51.
Unspecified	1,674	1,036	--	Malaysia 671; China 206; Tanzania 136.
Products:				
Nonrefractory[4]	18,815	86,555	--	Malaysia 46,902; Bangladesh 36,949.
Refractory including nonclay brick[5]	609	1,951	--	Malaysia 1,900.
Diamond:				
Gem, not set or strung ... value, thousands	$5,429	$7,818	$107	Hong Kong $2,677; Belgium-Luxembourg $2,390; Israel $889.
Industrial ... do	$520	$999	$108	Belgium-Luxembourg $453; Israel $253; Australia $109.
Diatomite and other infusorial earth	91	79	--	Malaysia 59; Brunei 10.
Feldspar, fluorspar, related materials	5,850	656	--	Malaysia 654.
Fertilizer materials:				
Crude:				
Nitrogenous	8	--		
Phosphatic	18,653	29,988	--	Malaysia 27,840; Taiwan 1,836.
Manufactured:				
Ammonia	377	352	--	Malaysia 229; Sri Lanka 22; Vietnam 17.
Nitrogenous	61,916	124,117	--	China 88,943; Malaysia 30,238; Kampuchea 4,471.
Phosphatic	73,526	3,068	--	Malaysia 1,897; Kampuchea 1,005.
Potassic	188,654	266,514	--	Malaysia 87,838; China 78,330; Philippines 64,291.
Unspecified and mixed	102,547	78,588	--	Malaysia 71,588.
Graphite, natural	126	124	--	Malaysia 120.
Gypsum and plaster	1,251	1,076	--	Malaysia 950; Taiwan 53; Brunei 27.
Halogens:				
Bromine ... value	$1,401	$1,893	NA	NA.
Fluorine ... do	$2,335	$9,940	NA	NA.
Iodine ... do	$13,077	$21,300	NA	NA.
Lime	6,457	19,134	--	Malaysia 11,199; Brunei 7,592.
Magnesium compounds: Magnesite	337	333	--	Pakistan 208; Malaysia 120.
Mica, all forms	274	351	--	Malaysia 157; Bangladesh 55; Papua New Guinea 44.
Pigments, mineral:				
Natural, crude	49	51	--	Thailand 18.
Iron oxides and hydroxides, processed	449	844	--	Malaysia 759; Bangladesh 36.
Precious and semiprecious stones other than diamond ... value, thousands	$27,847	$30,444	$628	Hong Kong $25,999; Thailand $2,431; Japan $657.
Salt and brine	13,695	14,033	--	Malaysia 12,783; Brunei 611.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	249	252	--	Malaysia 197.
Sodium carbonate, natural and manufactured	13,139	8,127	--	Malaysia 7,942.
Sodium hydroxide	3,509	7,699	--	Malaysia 2,216; Japan 1,300; Hong Kong 1,216.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	191	294	--	Malaysia 86; Philippines 21.
Worked	e710	2,043	--	Brunei 835; Malaysia 571; Taiwan 329.
Dolomite, chiefly refractory-grade	40	80	NA	NA.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Gravel and crushed rock	2,985	1,756	--	Malaysia 1,551.
Limestone other than dimension	627	519	--	Malaysia 135.
Quartz and quartzite kilograms	183	11,081	NA	NA.
Sand other than metal-bearing	583	884	--	Malaysia 403; Brunei 209; Japan 107.
Sulfur:				
Elemental:				
Crude including native and by-product	3,130	9,006	--	India 5,734; Malaysia 2,514; North Korea 613.
Colloidal, precipitated, sublimed	17,451	20,060	--	Malaysia 12,171; Thailand 6,036; India 1,809.
Dioxide kilograms	292	5,676	NA	NA.
Sulfuric acid	782	1,607	--	Sri Lanka 700; Malaysia 553; Brunei 304.
Talc, steatite, soapstone, pyrophyllite	554	1,222	--	Malaysia 1,151.
Other:				
Crude	49,207	31,273	--	Malaysia 28,407; Philippines 1,894.
Slag and dross, not metal-bearing	13,247	7,904	--	Japan 6,731; United Arab Emirates 501; Malaysia 280.
Oxides and hydroxides of barium, magnesium, strontium	11	5	NA	NA.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	17,174	7,250	--	Malaysia 4,766; Brunei 1,574.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	7,656	7,668	--	Vietnam 3,300; Malaysia 2,162; Burma 1,000; Kampuchea 1,000.
Carbon: Carbon black	687	351	--	Malaysia 349.
Coal: All grades including briquets	1,588	606	--	Thailand 324; Papua New Guinea 101; China 42.
Coke and semicoke	8,486	7,612	--	Malaysia 7,201; Sri Lanka 380.
Hydrogen, helium, rare gases value, thousands	$1,498	$2,566	--	Thailand $889; Malaysia $748.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	552	368	--	All to Malaysia.
Refinery products:				
Liquefied petroleum gas do	1,699	2,280	--	Thailand 947; Hong Kong 725; Malaysia 465.
Gasoline:				
Aviation do	511	187	--	Australia 71; Papua New Guinea 45; Malaysia 40.
Motor do	13,748	13,855	864	Malaysia 5,375; Hong Kong 1,436; Australia 1,416.
Mineral jelly and wax do	263	85	--	Malaysia 19; Taiwan 15; Thailand 13.
Kerosine do	7,499	10,724	213	India 2,701; Hong Kong 2,233; Malaysia 1,556.
Jet fuel do	15,606	13,745	259	Japan 4,043; Hong Kong 2,708; New Zealand 1,205.
Distillate fuel oil do	33,282	37,622	222	Malaysia 9,778; Thailand 5,579; Australia 3,727.
Lubricants do	3,532	2,666	--	Thailand 762; Malaysia 679; Saudi Arabia 234.
Nonlubricating oils do	472	459	--	Sweden 259; Philippines 89; Malaysia 73.
Residual fuel oil do	62,108	60,810	2,226	Hong Kong 24,140; Japan 14,036; Australia 4,846.
Bitumen and other residues do	1,182	992	--	Malaysia 255; Australia 250; United Arab Emirates 132.
Bituminous mixtures do	10	30	--	Hong Kong 4; Brunei 3.
Naphtha do	19,167	24,406	494	Japan 18,465; New Zealand 1,679; Australia 1,087.
Petroleum coke do	21	--	--	
Unspecified do	978	298	--	Malaysia 92; Hong Kong 86; New Zealand 24.
Tars and other crude chemicals derived from coal, gas, and petroleum	4,439	5,316	--	Malaysia 2,784; Taiwan 2,380.

NA Not available.
[1]Less than 1/2 unit.
[2]May include platinum-group metals.
[3]Excludes unreported quantity valued at $1,868 in 1980 and $7,100 in 1981.
[4]Excludes quantity of ceramic building bricks valued at $75,191 in 1980 and $193,118 in 1981.
[5]Excludes quantity of refractory bricks valued at $299,365 in 1980 and $365,983 in 1981.
[6]Excludes unreported quantity valued at $467.

Table 14.—Singapore: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals:				
Alkaline-earth metals	121	37	--	Japan 20; West Germany 17.
Rare-earth metals	13	1	NA	NA.
Aluminum:				
Ore and concentrate	400	19	--	All from China.
Oxides and hydroxides	8,185	6,625	301	China 5,270; Japan 964.
Metal including alloys:				
Scrap	433	394	9	Malaysia 323; Brunei 59.
Unwrought and semimanufactures	29,567	35,625	7,153	Japan 7,253; Australia 3,953; Malaysia 3,216.
Antimony: Metal including alloys, all forms	51	31	--	Malaysia 20; China 11.
Beryllium: Metal including alloys, all forms kilograms	20	--		
Bismuth: Metal including alloys, unwrought do	45	--		
Cadmium: Metal including alloys, unwrought	3	1	NA	NA.
Chromium: Oxides and hydroxides	307	266	110	Japan 74; West Germany 24; U.S.S.R. 17.
Cobalt:				
Oxides and hydroxides	3	8	--	Canada 7.
Metal including alloys, unwrought	7	6	--	All from Netherlands.
Columbium and tantalum:				
Ore and concentrate	208	307	--	Thailand 205; Malaysia 59.
Metal including alloys, all forms kilograms	34	80	NA	NA.
Copper:				
Ore and concentrate	(1)	13	--	Japan 10.
Matte and speiss including cement copper	--	1	NA	NA.
Metal including alloys:				
Scrap	5,026	4,551	--	Malaysia 4,175.
Unwrought and semimanufactures	31,716	30,848	988	Japan 18,629; Taiwan 3,377; Australia 2,958.
Indium: Metal including alloys, unwrought kilograms	20	1,921	NA	NA.
Iron and steel:				
Iron ore and concentrate	9,605	30,876	--	Malaysia 30,728.
Metal:				
Scrap	172,028	78,214	26,172	Australia 43,521; Malaysia 7,298.
Pig iron, cast iron, related materials	33,184	63,040	690	Australia 50,984; China 10,112.
Ferroalloys:				
Ferromanganese	3,534	505	36	Australia 151; China 126; Taiwan 55.
Unspecified	4,878	9,070	53	Australia 5,636; China 1,250; New Caledonia 1,161.
Steel, primary forms	96,377	43,693	203	China 37,664; Japan 5,351.
Semimanufactures:				
Bars, rods, angles, shapes, sections	444,187	613,324	3,381	Japan 349,574; West Germany 70,555; Mozambique 40,935.
Universals, plates, sheets	656,724	802,521	7,130	Japan 574,696; Republic of Korea 83,767; Taiwan 54,112.
Hoop and strip	24,991	25,037	589	Japan 15,964; Australia 2,767; Republic of Korea 2,540.
Rails and accessories	25,651	13,323	119	Poland 11,098; Japan 1,469.
Wire	18,858	22,844	228	China 10,177; Japan 7,758; Belgium-Luxembourg 1,132.
Tubes, pipes, fittings	338,602	464,916	20,049	Japan 390,262; Malaysia 10,641; West Germany 5,135.
Castings and forgings, rough	10,691	12,118	2,119	Japan 7,393; Australia 1,550; France 661.
Lead:				
Ore and concentrate	190	5,010	--	Iran 5,000.
Oxides	554	612	--	Australia 340; West Germany 134; Japan 58.
Metal including alloys:				
Scrap	214	167	--	Brunei 117; Malaysia 27.
Unwrought	8,095	3,900	124	Australia 2,546; Burma 750.
Semimanufactures	856	665	16	Australia 372; Japan 71; Belgium-Luxembourg 57.
Magnesium: Metal including alloys, all forms	15	112	99	Japan 7.

See footnotes at end of table.

Table 14.—Singapore: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate	60,468	80,900	NA	NA.
Oxides	3,319	3,103	20	Ireland 2,016; China 583; Japan 251.
Mercury 76-pound flasks	90	415	36	China 324.
Metalloids:				
Arsenic: Oxides and acids	10	--		
Unspecified	92	12	1	Japan 9.
Molybdenum:				
Ore and concentrate	78	30	--	Chile 25.
Metal including alloys, all forms	3	13	12	NA.
Nickel: Metal including alloys:				
Scrap	237	135	--	Malaysia 78; Philippines 33.
Unwrought and semimanufactures	1,357	1,638	26	New Caledonia 1,157.
Platinum-group metals: Metals including alloys, unwrought and partly wrought	19,290	128,249	124,005	Mauritius 2,508.
Silver:				
Ore and concentrate[2] kilograms	434	1,748	1,500	Japan 146.
Waste and sweepings[2] value, thousands	$146	$417	--	Malaysia $286; Taiwan $118.
Metal including alloys, unwrought and partly wrought thousand troy ounces	742	2,228	141	West Germany 1,254; Australia 337; Malaysia 325.
Tin:				
Ore and concentrate	3,370	1,996	--	Burma 1,229; Thailand 729.
Oxides	6	7	NA	NA.
Ash and residue containing tin	12,360	9,343	--	Malaysia 9,288.
Metal including alloys:				
Scrap	1,032	1,503	22	Australia 1,303.
Unwrought and semimanufactures	2,782	1,838	12	Malaysia 1,132; Hong Kong 328.
Titanium:				
Ore and concentrate	541	85	--	Australia 35; Malaysia 10.
Oxides	3,768	4,099	229	Japan 1,489; West Germany 831; Australia 549.
Metal including alloys, unwrought kilograms	684	3,812	3,068	United Kingdom 743.
Tungsten:				
Ore and concentrate	1,346	1,925	(1)	Burma 1,240; Australia 349; China 100.
Metal including alloys, all forms	160	89	6	Austria 35; China 18; Hong Kong 16.
Vanadium: Ore and concentrate	27	1	NA	NA.
Zinc:				
Ore and concentrate	139	75	--	Canada 50; Australia 25.
Oxides	531	494	15	China 152; United Kingdom 117; Malaysia 95.
Metal including alloys:				
Scrap	351	530	--	Malaysia 336; Australia 141.
Unwrought and semimanufactures	18,482	18,732	360	Canada 6,779; Australia 4,250; China 2,256.
Zirconium: Ore and concentrate	1,102	2,081	--	Australia 2,060.
Other:				
Ores and concentrates	304	222	--	Burma 203.
Oxides and hydroxides	754	1,118	82	China 430; Norway 221; West Germany 133.
Ashes and residues	r101,692	183,609	--	Japan 182,501; Malaysia 937.
Pyrophoric alloys	110	27	--	China 14; Austria 12.
Base metals including alloys, all forms	13	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	298	594	279	China 250.
Artificial: Corundum kilograms	68	5,000	NA	NA.
Dust and powder of precious and semiprecious stones including diamond value	$8,874	$5,206	NA	NA.
Grinding and polishing wheels and stones[3]	2,062	2,063	75	Japan 885; China 311; Italy 258.
Asbestos, crude	16,661	16,824	2,313	Australia 3,978; Canada 1,402; China 825.
Barite and witherite	66,343	29,698	106	Thailand 16,880; China 11,634.
Boron materials:				
Crude natural borates	748	782	782	
Oxides and acids	175	239	71	China 140.
Cement thousand tons	1,831	1,954	2	Japan 1,227; Republic of Korea 316.
Chalk	8,854	5,003	--	Malaysia 3,135; United Kingdom 775; Thailand 714.

See footnotes at end of table.

Table 14.—Singapore: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Clays and clay products:				
Crude:				
Andalusite, kyanite, sillimanite	--	2	NA	NA.
Bentonite	46,778	68,208	67,163	Spain 342; China 330; India 245.
Fuller's earth	4,856	6,280	152	West Germany 4,519; United Kingdom 1,235.
Kaolin	5,286	6,573	--	Malaysia 4,140; Japan 1,162; United Kingdom 737.
Unspecified	13,753	11,404	351	Malaysia 7,074; Japan 2,665; China 574.
Products:				
Nonrefractory[4]	96,682	107,388	237	Italy 53,511; Japan 17,795; Sri Lanka 7,805.
Refractory including nonclay brick[5]	13,181	14,086	257	Japan 5,384; United Kingdom 4,196; Australia 740.
Diamond:				
Gem, not set or strung value, thousands	$69,415	$45,824	$501	India $14,477; Israel $13,879; Belgium-Luxembourg $11,277.
Industrial do	$4,579	$3,509	$49	Israel $1,270; Belgium-Luxembourg $1,038; China $437.
Diatomite and other infusorial earth	619	555	307	Japan 122; Philippines 101.
Feldspar, fluorspar, related materials	8,312	5,550	--	India 2,619; China 1,575; Thailand 666.
Fertilizer materials: Manufactured:				
Ammonia	437	391	78	Malaysia 126; Netherlands 46; Japan 45.
Nitrogenous	52,169	142,635	27	U.S.S.R. 88,951; West Germany 22,599; Netherlands 10,750.
Phosphatic	36,977	48	--	Netherlands 36.
Potassic	307,627	257,315	10,500	Canada 192,690; Israel 26,387; West Germany 21,571.
Unspecified and mixed	139,747	71,192	127	West Germany 50,946; Belgium-Luxembourg 12,320; Malaysia 6,376.
Graphite, natural	572	554	--	China 290; West Germany 110; India 50.
Gypsum and plaster	76,910	83,527	26	Australia 51,351; Japan 21,568; Thailand 9,625.
Halogens:				
Bromine and fluorine value	$38,763	$13,253	NA	NA.
Iodine do	$28,956	$50,173	--	Japan $31,240; West Germany $13,253.
Lime	16,453	13,733	--	China 5,572; Malaysia 5,342; Thailand 1,869.
Magnesium compounds: Magnesite	638	431	34	Norway 240; West Germany 89.
Mica, all forms	1,455	1,275	181	India 613; China 405.
Phosphates, crude	20,393	20,250	--	Christmas Island 18,250; India 797.
Pigments, mineral:				
Natural, crude	--	57	--	Japan 43.
Iron oxides and hydroxides, processed	2,422	3,141	153	West Germany 1,118; Japan 815; China 733.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$26,775	$26,784	$32	Kenya $20,992; Colombia $1,029; Sri Lanka $1,028.
Synthetic do	$217	$226	--	Japan $155; Thailand $46.
Salt and brine	48,064	41,477	--	Thailand 25,887; Australia 9,515; Israel 3,065.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	482	587	56	Japan 123; Hong Kong 113; Spain 108.
Sodium carbonate, natural and manufactured	28,675	23,433	--	Kenya 18,300; Romania 2,230; East Germany 999.
Sodium hydroxide	30,392	20,696	6,151	East Germany 4,405; China 3,750; West Germany 1,801.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,099	3,050	--	Malaysia 2,025; Italy 190; Pakistan 170.
Worked	15,972	19,879	94	Italy 10,264; China 5,344; Taiwan 1,337.
Dolomite, chiefly refractory-grade	2,348	2,763	--	Thailand 2,250; Malaysia 476.

See footnotes at end of table.

Table 14.—Singapore: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Gravel and crushed rock	62,240	24,839	58	Malaysia 21,308; Thailand 732; India 603.
Limestone other than dimension	69,712	63,569	--	Japan 49,199; Malaysia 14,170.
Quartz and quartzite	635	539	--	China 470.
Sand other than metal-bearing	58,975	217,058	1,892	Malaysia 212,496.
Sulfur:				
Elemental:				
Crude including native and by-product	245	219	16	Poland 151; China 15.
Colloidal, precipitated, sublimed	596	3,273	16	China 3,060; Poland 110.
Dioxide	4	11	--	United Kingdom 9.
Sulfuric acid	322	193	35	West Germany 64; Malaysia 48; Australia 25.
Talc, steatite, soapstone, pyrophyllite	5,143	9,000	117	China 6,327; Republic of Korea 1,638.
Other:				
Crude	5,288	23,554	18	West Germany 21,358.
Slag and dross, not metal-bearing	7,746	1,182	--	United Kingdom 555; West Germany 333.
Oxides and hydroxides of barium, magnesium, strontium	43	17	NA	NA.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	9,844	13,230	58	Malaysia 7,412; Italy 2,199; Thailand 553.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,246	1,507	170	Republic of Korea 540; China 350; Taiwan 200.
Carbon: Carbon black	9,161	7,448	235	Malaysia 3,549; Japan 2,464; China 553.
Coal: All grades including briquets	2,298	3,196	3,124	United Kingdom 28.
Coke and semicoke	11,778	14,338	--	Japan 10,437; Taiwan 1,700; China 722.
Hydrogen, helium, rare gases value, thousands	$1,111	$1,835	$669	United Kingdom $440; Japan $268; Australia $251.
Petroleum and refinery products:				
Crude and partly refined thousand 42-gallon barrels	185,431	234,261	--	Saudi Arabia 148,616; Malaysia 27,438; Kuwait 23,628.
Refinery products:				
Liquefied petroleum gas do	35	15	--	Australia 14.
Gasoline:				
Aviation do	455	289	--	Australia 210; Netherlands Antilles 62.
Motor do	124	728	--	Bahrain 307; Netherlands 188; Australia 139.
Mineral jelly and wax do	106	47	2	China 40.
Kerosine do	r346	1,125	--	Malaysia 560; Saudi Arabia 215; Italy 170.
Jet fuel do	357	420	--	Yemen (Aden) 212; Brunei 80; Australia 46.
Distillate fuel oil do	4,288	2,128	236	China 749; Australia 728; Bahrain 356.
Lubricants do	702	490	35	Australia 180; Netherlands Antilles 104; Malaysia 47.
Nonlubricating oils do	51	53	14	China 11; Malaysia 7; United Kingdom 4.
Residual fuel oil do	30,348	23,036	3,922	Bahrain 8,774; Kuwait 2,351; Kenya 2,128.
Bituminous mixtures do	r11	13	1	Australia 5; Thailand 4; United Kingdom 2.
Naphtha do	1,960	2,334	(1)	Malaysia 1,614; United Arab Emirates 251.
Petroleum coke do	22	16	15	West Germany 1.
Unspecified do	r31	67	21	Japan 27.
Tars and other crude chemicals derived from coal, gas, and petroleum	6,678	7,110	169	Australia 4,157; United Kingdom 2,178.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]May include platinum-group metals.
[3]Excludes unreported quantity valued at $31,291 in 1980 and $90,878 in 1981.
[4]Excludes unreported quantity of bricks and baked clay valued at $456,753 in 1980 and $2,830,028 in 1981.
[5]Excludes unreported quantity valued at $8,297,684 in 1980 and $3,960,335 in 1981.

SRI LANKA[27]

Sri Lanka's major mineral assets were titanium-bearing beach sands, graphite, gem stones, and the fertilizer mineral apatite. Mica, feldspar, limestone, and several types of clays were produced for domestic consumption. All mineral fuels were imported in 1982. Imported crude oil was refined at Sapugaskanda near Colombo.

Exports of mineral commodities were not an important factor in the economy, generally accounting for 3% to 4% of total value. Titanium minerals, gem stones, graphite, and surplus refinery products account for most of the value. The new fertilizer plant now consumes the naphtha output that had been a major surplus item.

Economic conditions declined somewhat in 1982. There was still a large budget and trade deficit. Real GDP increased less than that of 1981. The industrial output, which suffered from electric power shortages and a shutdown at the oil refinery in 1981, began moving forward again in the first half of 1982. The inflation rate apparently fell to between 10% and 15% in 1982 compared with 18% in 1981 and 26% in 1980.

COMMODITY REVIEW

Nonmetals.—*Cement.*—The country's construction industry was getting a considerable boost with the addition of two new cement kilns at the Sri Lanka Cement Corp. Kankesanturai facility on the northern tip of the island. The kilns will be 4.6 by 70 meters, and each will produce 1,600 tons per day of clinker. The kilns reportedly will be coal fired and save considerably over the cost of oil-fired units. At least one kiln was scheduled for firing in January 1983. The existing equipment at Kankesanturai dates back to 1950, and it was not known if the new units will replace or supplement the older plant.

Fertilizer Materials.—Agrico Chemicals Co. of the United States and the Government-owned State Mining and Mineral Development Corp. have signed a joint-venture agreement to establish a project for apatite mining and the construction of a phosphoric acid, diammonium phosphate, and triple superphosphate complex. The new company was named Eppawala Phosphate Private Ltd. and will mine a planned 600,000 tons per year of apatite from the 25-million-ton Eppawala deposit 190 kilometers north of Colombo. The fertilizer plant will probably be located at Trincomalee on the east coast. Estimated project cost is $350 million.

Gem Stones.—Sri Lanka has been a major gem stone and jewelry producer since before the Christian era. Two of its famous sapphires are the inappropriately named 466-carat "Star of India" and the 400-carat "Blue Belle of Asia" now in the Royal British Crown. A more recently discovered 1,082-carat sapphire will be added to the British Crown. Aquamarine, garnet, cat's eye, amethyst, moonstone, alexandrite, and 10 other types are also produced in quantity. Only diamond, emerald, and opal of the common gem stones are not produced in Sri Lanka.

The Government granted concession areas for mechanized mining to several local and foreign companies in 1981. It wanted to salvage some value from potential gem stone-rich areas that were to be flooded when the large Mahaweli irrigation project was completed. The mining reportedly was not successful as three of the companies pulled out of the operation in 1982 and another was only able to find a small amount of semiprecious stones. Two more firms apparently decided against starting operations at all. The Government had hoped to make a considerable amount of revenue from the gemming areas before they were permanently covered by waters of the reservoirs.

Graphite.—Sri Lanka was a major producer of natural graphite and exported high-quality material for use in lubricants. Production has been decreasing over the last several years, so a program will be implemented to increase production threefold. The industry is to be modernized with an expenditure of $29 million. The Asian Development Bank will be providing $20.7 million. The project will consist of rehabilitation and expansion of operating mines, redevelopment of some abandoned mines, systematic exploration and evaluation of graphite potential, strengthening of the State Mining and Mineral Development Corp. institutional structure, and upgrading of physical facilities.

Mineral Fuels.—*Petroleum.*—Sri Lanka produced no oil or gas during 1982. Its one refinery uses imported crude oil to supply most of the needs of the country but at a high cost in foreign exchange. Ceylon Petroleum Corp. (CPC), the Government-owned oil company, controls the petroleum sector and leases offshore blocks to several overseas companies. Gravity, magnetic, and seismic surveys were done by several compa-

nies during 1981-82.

A new production-sharing contract was signed between CPC and South East Asia Oil & Gas Co. covering blocks 6 and 7 off the country's south coast. The company will spend $5 million to conduct geological studies and seismic surveys on the blocks and is committed to drill one wildcat well.

Table 15.—Sri Lanka: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	--	1	--	All to Pakistan.
Metal including alloys, all forms	[1]35	12	--	Kenya 11.
Copper: Metal including alloys, all forms value	$7,147	$1,734	--	Maldives $1,547; Netherlands $104; United Kingdom $83.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	--	9,275	--	Netherlands 7,800; Japan 1,475.
Pyrite, roasted	--	32,816	--	Japan 27,316; France 5,500.
Metal: Steel, primary forms	[2]46	33	--	Mainly to Nigeria.
Lead:				
Oxides	303	66	--	Republic of South Africa 50; Bangladesh 16.
Metal including alloys:				
Scrap	--	211	--	Pakistan 100; India 50; Republic of South Africa 50.
All forms	379	301	--	Republic of South Africa 140; Pakistan 100; India 50.
Silver: Metal including alloys, unwrought and partly wrought value	$54,558	$2,054	$37	Dubai $1,993.
Tin: Metal including alloys, all forms do	$305			
	23,970	32,816	--	Japan 27,316; France 5,500.
Titanium: Ore and concentrate				
Tungsten: Metal including alloys, all forms value	--	$336	--	All to Netherlands.
Uranium and/or thorium: Metal including alloys, all forms kilograms	15	--		
Zinc: Oxides	50	--		
Other:				
Ores and concentrates	11,900	9,275	--	Netherlands 7,800; Japan 1,475.
Ashes and residues kilograms	--	2	--	All to United Kingdom.
Base metals including alloys, all forms value	$3,729	$1,217	--	Mainly to Norway.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones do	$34	--		
Boron materials: Oxides and acids do	$81			
	200	202	--	All to Maldives.
Cement				
Clays and clay products:				
Crude, unspecified	11	4	[3]	Netherlands 2; United Kingdom 1.
Products:				
Nonrefractory	13,344	9,313	791	Singapore 2,697; Hong Kong 2,504; Australia 811.
Refractory including nonclay brick	12	8	--	NA.
Fertilizer materials: Manufactured:				
Ammonia kilograms	12	--		
Unspecified and mixed	6	[3]	--	All to Maldives.
Graphite, natural	6,604	4,350	1,182	Japan 1,829; India 366; United Kingdom 365.
Halogens:				
Chlorine	--	1	--	All to Maldives.
Unspecified kilograms	--	13	--	All to Pakistan.
Mica:				
Crude including splittings and waste	630	1,393	[3]	Japan 786; Libya 400; Belgium-Luxembourg 190.
Worked including agglomerated splittings kilograms	10	--		
Phosphates, crude	--	13	--	All to United Kingdom.
Precious and semiprecious stones other than diamond:				
Natural carats	275,562	231,835	18,145	United Kingdom 53,073; West Germany 41,535; Hong Kong 32,996; Japan 32,361.
Synthetic do	58,814	13,568	13,372	Japan 121; Australia 55.

See footnotes at end of table.

Table 15.—Sri Lanka: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Pyrite, unroasted kilograms	2	--	--	
Salt and brine	6,180	16,512	--	Kenya 8,500; Bangladesh 8,000.
Sodium and potassium compounds, n.e.s. kilograms	--	28	--	All to Maldives.
Stone, sand and gravel	53	(3)	--	All to West Germany.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value	$451	$26,907	--	Mainly to Bahrain.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black kilograms	14	--		
Hydrogen, helium, rare gases do	470	11,356	--	All to Maldives.
Petroleum and refinery products:				
Partly refined 42-gallon barrels	2,104	1,191	--	Mainly to Maldives.
Refinery products:				
Nonbunker:				
Liquefied petroleum gas do	25	58	--	All to Maldives.
Gasoline do	418,136	1,538	--	Do.
Kerosine and jet fuel do	(3)	225,716	--	Malaysia 225,200.
Distillate fuel oil do	--	162,248	--	India 162,055.
Lubricants do	r13	--		
Nonlubricants do	--	820,582	--	Malaysia 539,979; Singapore 151,694.
Residual fuel oil do	1,248,454	139,122	--	All to Malaysia.
Other do	r27	--		
Bunker:				
Jet fuel do	r669,336	813,680		
Distillate fuel oil do	430,375	269,291		
Lubricants do	r5,294	611		
Residual fuel oil do	2,080,244	1,254,597		
Tars and other crude chemicals derived from coal, gas, and petroleum	66,956	19,705	--	Mainly to Singapore.

rRevised.
[1]Reported quantity exported valued at $122,817; unreported quantity valued at $114,515 also exported.
[2]Excludes unreported quantity valued at $1,462.
[3]Less than 1/2 unit.

Table 16.—Sri Lanka: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals kilograms	88	234	106	United Kingdom 128.
Aluminum:				
Ore and concentrate	210	(1)	--	All from West Germany.
Oxides and hydroxides	17	110	1	United Kingdom 73; Japan 35.
Metal including alloys:				
Scrap	7	1	--	All from United Kingdom.
Unwrought	4	(2)	--	Mainly from Singapore.
Semimanufactures	7,834	15,484	(1)	Republic of South Africa 11,450; United Kingdom 799; Hong Kong 605; India 544.
Chromium:				
Ore and concentrate	54	36	--	All from Netherlands.
Oxides and hydroxides	10	1	--	Mainly from United Kingdom and Netherlands.
Cobalt: Oxides and hydroxides kilograms	750	--		
Copper:				
Matte and speiss including cement copper	--	6	--	All from United Kingdom.
Metal including alloys:				
Unwrought	3	8	--	United Kingdom 6; India 2.
Semimanufactures	1,500	1,355	(1)	Australia 625; Japan 220; United Kingdom 150.

See footnotes at end of table.

Table 16.—Sri Lanka: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Gold:				
Ore and concentrate ____ value__	NA	$44,840	--	All from Hungary.
Metal including alloys, unwrought and partly wrought ____ do____	NA	$7,662	$255	West Germany $7,208; United Kingdom $189.
Iron and steel:				
Iron ore and concentrate including roasted pyrite ____ do____	--	$731	$731	
Metal:				
Scrap ____	(3)	10	(1)	All from Japan.
Pig iron, cast iron, related materials ____	322	217	(1)	Republic of South Africa 98; France 50; Australia 25.
Ferroalloys:				
Ferromanganese ____	51	65	--	Republic of South Africa 55; United Kingdom 10.
Ferrosilicon ____	NA	9	--	Norway 7.
Unspecified ____	42	122	--	France 50; Republic of South Africa 43; Australia 10.
Steel, primary forms ____	r36,871	24,020	(1)	Australia 14,798; Republic of South Africa 5,802; Zimbabwe 2,974.
Semimanufactures:				
Bars, rods, angles, shapes, sections ____	50,923	77,265	(1)	Republic of South Africa 53,515; Japan 6,475; United Kingdom 6,077.
Universals, plates, sheets __	29,918	30,073	223	Japan 13,027; Republic of South Africa 7,083; West Germany 3,922.
Hoop and strip ____	2,335	5,674	35	Republic of South Africa 3,976; United Kingdom 866; Japan 364.
Rails and accessories ____	5,185	67	--	Sweden 47; United Kingdom 18.
Wire ____	4,797	6,881	--	Republic of South Africa 3,623; China 1,237; Japan 1,149.
Tubes, pipes, fittings ____	7,897	6,401	4	United Kingdom 1,515; Republic of South Africa 1,402; Japan 1,140.
Castings and forgings, rough value, thousands__	$66	$11	--	United Kingdom $5; West Germany $3; Italy $2.
Lead:				
Oxides ____	9	11	(1)	United Kingdom 5; West Germany 3; Netherlands 2.
Metal including alloys:				
Scrap ____	4462	912	10	Australia 748; Denmark 98; United Kingdom 31.
Unwrought ____	124	15	--	Japan 4; Singapore 4; Sweden 3; United Kingdom 3.
Magnesium: Metal including alloys:				
Scrap ____	--	1	--	Mainly from Japan.
Unwrought ____	--	(1)	--	All from Switzerland.
Semimanufactures ____	--	1	--	All from Japan.
All forms ____ value__	$3,027	$6,517	--	Denmark $3,369; Japan $1,659; Netherlands $1,313.
Manganese:				
Ore and concentrate, metallurgical-grade ____	1,744	1,147	--	Singapore 1,097; United Kingdom 50.
Oxides ____	534	416	--	Singapore 181; India 175.
Mercury ____ 76-pound flasks__	13	348	(1)	Mainly from West Germany.
Metalloids:				
Arsenic: Oxides and acids kilograms__	1	--	--	
Unspecified ____ do____	99	5,743	--	West Germany 4,980; Singapore 578.
Molybdenum: Metal including alloys, all forms ____ kilograms__	60	12	--	Mainly from Sweden.
Nickel:				
Matte and speiss ____	--	11	--	Netherlands 8; United Kingdom 3.
Metal including alloys, all forms ___	10	5	--	United Kingdom 4; Canada 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces__	386	(5)	--	Mainly from United Kingdom.
Silver:				
Waste and sweepings[6] ____ value__	--	$598	--	All from Japan.
Metal including alloys, unwrought and partly wrought ____	4,180	7984	--	Mainly from United Kingdom.
Tin:				
Ore and concentrate ____	50	--		
Oxides ____ value__	$15,069	--		

See footnotes at end of table.

Table 16.—Sri Lanka: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys:				
Scrap ——— value	$12,526	$55,888	--	France $20,998; West Germany $16,646; United Kingdom $10,525.
Unwrought	16	7	--	Denmark 4; Malaysia 2.
Semimanufactures	34	(1)	--	Mainly from United Kingdom.
Titanium: Oxides	48	66	(1)	West Germany 16; Belgium-Luxembourg 15; India 13; United Kingdom 12.
Tungsten: Metal including alloys, all forms	15	(1)	--	NA.
Uranium and/or thorium:				
Oxides and other compounds	69	4	(1)	Mainly from China.
Metal including alloys, all forms value	--	$65	--	All from United Kingdom.
Zinc:				
Oxides	820	461	(1)	China 170; United Kingdom 105; Belgium-Luxembourg 77.
Blue powder ——— kilograms	302	4,665	--	Austria 3,300; West Germany 1,007.
Metal including alloys:				
Scrap	5	61	--	Japan 50; Australia 11.
Unwrought	672	290	--	Japan 205; Australia 70; United Kingdom 15.
Semimanufactures	69	29	1	Australia 20; Singapore 6.
Other:				
Ores and concentrates	2	2	--	All from Sweden.
Oxides and hydroxides	12	(1)	(1)	
Pyrophoric alloys ——— value	$42,597	$17,834	$2	Mainly from United Kingdom.
Base metals including alloys, all forms kilograms	153	11,369	(8)	China 10,000.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	41	27	6	India 19; United Kingdom 2.
Artificial: Corundum	2	1	--	All from India.
Dust and powder of precious and semi-precious stones including diamond value	r$21,111	$6,682	$3,707	Singapore $623; Belgium-Luxembourg $583.
Grinding and polishing wheels and stones	127	61	1	United Kingdom 21; India 12; Czechoslovakia 8.
Asbestos, crude	6,188	4,222	--	Canada 3,813; United Kingdom 199; Republic of South Africa 50.
Barite and witherite	47	27	--	India 25.
Boron materials:				
Crude natural borates	--	17	17	
Oxides and acids	13	33	22	India 5; Netherlands 4; Singapore 2.
Cement	215,168	41,864	--	Japan 40,640; Netherlands 750; Rwanda 165.
Chalk	144	120	--	United Kingdom 105; Belgium-Luxembourg 15.
Clays and clay products:				
Crude, unspecified	1,696	6,106	11	Thailand 3,394; India 813; United Kingdom 735; Japan 551.
Products:				
Nonrefractory value, thousands	$589	$353	(1)	India $158; West Germany $65; Italy $50.
Refractory including nonclay brick	4,529	1,382	133	West Germany 320; United Kingdom 299; Japan 175.
Diamond:				
Gem, not set or strung ——— value	$42,405	$393,000	--	Hong Kong $201,000; United Kingdom $155,000; Belgium-Luxembourg $37,000.
Industrial ——— do	$1,952	$14,000	--	Mainly from India.
Diatomite and other infusorial earth	3,037	15	2	West Germany 8; United Kingdom 4.
Feldspar, fluorspar, related materials	1	(1)	--	All from India.
Fertilizer materials:				
Crude, n.e.s	27,502	13,301	--	Mainly from Egypt.
Manufactured:				
Ammonia	133	99	--	United Kingdom 66; Netherlands 18; Singapore 12.

See footnotes at end of table.

Table 16.—Sri Lanka: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured —Continued				
Nitrogenous	201,164	147,415	1	Japan 79,135; Republic of Korea 38,400; Saudi Arabia 11,271; Netherlands 10,000.
Phosphatic	49,963	22,921	1,210	Netherlands 11,000; Tunisia 10,500.
Potassic	94,934	72,395	--	Canada 36,000; West Germany 25,500; East Germany 10,851.
Unspecified and mixed	29,883	39,516	(1)	Republic of Korea 27,495; Japan 7,501; Netherlands 4,500.
Graphite, natural kilograms	--	4	--	Mainly from Japan.
Gypsum and plaster	198,965	16,043	--	India 14,641; West Germany 1,246; United Kingdom 108.
Halogens:				
Chlorine value	--	$2,180	--	Mainly from Hong Kong.
Unspecified kilograms	43	1	--	Mainly from West Germany.
Lime	324	6	--	Mainly from United Kingdom.
Magnesium compounds: Magnesite	5	432	--	India 312; Netherlands 100.
Mica:				
Crude including splittings and waste	21	2	2	
Worked including agglomerated splittings kilograms	41	22	--	Singapore 20.
Nitrates, crude	--	88	--	West Germany 40; China 20; Belgium-Luxembourg 11.
Pigments, mineral:				
Natural, crude	11	--	--	
Iron oxides and hydroxides, processed	850	525	--	West Germany 312; Netherlands 100; India 73.
Precious and semiprecious stones other than diamond:				
Natural thousand carats	717	25,015	--	Mainly from West Germany.
Synthetic value	$7,054	$8,000	--	Mainly from Netherlands.
Pyrite, unroasted	(1)	10	--	All from Japan.
Salt and brine	6	39	--	West Germany 27; India 10.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	35	30	--	France 17; Belgium-Luxembourg 5; Republic of South Africa 4.
Sodium carbonate, natural and manufactured	4,933	3,007	500	Kenya 1,275; United Kingdom 510; West Germany 420.
Sodium hydroxide	2,714	5,964	--	West Germany 4,001; Italy 1,500.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	143	886	--	India 587; Sweden 239.
Worked	60	254	--	France 162; Italy 72.
Dolomite, chiefly refractory-grade	5	6	--	West Germany 5.
Gravel and crushed rock	397	104	--	Pakistan 45; Japan 25; China 18; India 10.
Limestone other than dimension	(1)	2	--	All from Singapore.
Quartz and quartzite value	$161	--	--	
Sand other than metal-bearing	1	90	--	West Germany 52; Japan 30.
Sulfur:				
Elemental:				
Crude including native and by-product	431	125	2	West Germany 63; Belgium-Luxembourg 45; United Kingdom 13.
Colloidal, precipitated, sublimed	642	338	--	West Germany 144; Belgium-Luxembourg 65; China 50; Thailand 45.
Dioxide kilograms	4	--	--	
Sulfuric acid	697	455	--	Singapore 418; Netherlands 23; United Kingdom 13.
Talc, steatite, soapstone, pyrophyllite	1,215	1,070	--	China 928; India 94; Japan 11; Norway 10.
Other:				
Crude	3,229	4,724	18	India 2,473; China 928; West Germany 508.
Oxides and hydroxides of barium, magnesium, strontium	11	15	8	Japan 3; Thailand 3.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals value, thousands	(2)	$1,430	--	Indonesia $1,081; Italy $102; West Germany $101.

See footnotes at end of table.

Table 16.—Sri Lanka: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2	4	--	All from United Kingdom.
Carbon: Carbon black	3,310	2,476	12	Australia 783; Romania 438; Philippines 312; Thailand 295.
Coal: All grades including briquets	288	313	1	Thailand 272; United Kingdom 40.
Coke and semicoke	2,429	1,600	--	Japan 885; Republic of South Africa 320; Singapore 205.
Hydrogen, helium, rare gases	13	139	(1)	Singapore 124; India 9.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	13,722	11,183	--	Saudi Arabia 7,878; Iran 3,089.
Refinery products:				
Liquefied petroleum gas value	$11,039	$351,212	--	Mainly from Singapore.
Gasoline:				
Aviation 42-gallon barrels	8,778	--	--	
Motor do	--	26	17	West Germany 8.
Mineral jelly and wax do	7,106	6,815	24	West Germany 6,053.
Kerosine and jet fuel do	612,897	346,534	--	Mainly from Singapore.
Distillate fuel oil do	223,372	367,584	--	Do.
Lubricants do	26,404	90,251	602	Do.
Bituminous mixtures do	162	315	--	West Germany 255; United Kingdom 60.
Petroleum coke do	60,620	38,639	--	Singapore 26,180; Bahrain 12,459.
Unspecified do	53,153	156,924	(1)	Mainly from Singapore.
Tars and other crude chemicals derived from coal, gas, and petroleum	129	306	--	Mainly from West Germany.

rRevised. NA Not available.
[1]Less than 1/2 unit.
[2]Unreported quantity valued at $227.
[3]Unreported quantity valued at $41,226.
[4]Excludes unreported quantity valued at $400,326.
[5]Unreported quantity valued at $1,733.
[6]May include other precious metals.
[7]Excludes unreported quantity valued at $4,840.
[8]Unreported quantity valued at $3,802.
[9]Quantity imported in 1980 was 19,479 metric tons.

VIETNAM[27]

Vietnam produced small amounts of a number of minerals, the most important of which were coal, phosphate rock, tin, chromite, hydraulic cement, and clays. It also had its first full year of economically significant production of natural gas.

Mineral exports were not of much significance to the Vietnamese economy. Coal, chromite, and tin were the most valuable. In past years, phosphate rock was an important export item. Since the border hostilities in 1979, production has been greatly reduced and exports have either been stopped altogether or reduced to insignificance.

In 1982, the economy as a whole seemed to be making a recovery from 2 years of serious problems. A record food-grain harvest was the biggest factor, 8% over that of 1981 and a 13% increase over the 1980 crop. The situation in the industrial sector, however, was not so favorable and there was very little comment in the press about achievements in the mineral industry during 1982.

The Government's major priorities in 1982-85 were to be in the agricultural sector, followed by consumer goods and increased overall exports.

The mineral sector's main problems lay not in lack of resources but in a shortage of competent managers and technical staff, woefully inadequate maintenance and spare parts facilities, and an overall transportation system that appeared to be deteriorating rather than improving. Added to the above problems was an electric power sector that, while making excellent increases in power capacity and generation, still cannot keep up with an even faster increase in demand for power from the agricultural and industrial sectors.

COMMODITY REVIEW

Metals.—*Tin.*—Vietnam's small tin industry has been under expansion with Soviet aid for several years. The Government has reported finding "a number of new, rather large deposits"[28] in recent years. One new mine began operation in 1982 at Khuon Phay in Ha Tuyen Province. This was referred to as the tin processing plant. This almost certainly refers to a cassiterite ore concentration plant. The mine was designed to produce 300,000 cubic meters of ore per year. Another mine in the same Son Duong mining area, Bac Lung, was still under development. Also starting operation sometime after mid-1981 was the expanded section of the Tinh Tuc tin mine in Cao Bang Province. If the omnipresent problems with equipment maintenance and transportation can be kept to an acceptable level, the opening of these two projects will mean a substantial increase in Vietnam's tin output.

Nonmetals.—*Cement.*—Vietnam has been constructing major new cement plants in an all-out effort to increase output to meet demand and possibly leave some surplus for export. The project has gone slowly and all of the new construction was behind original schedules. Three large rotary kiln plants are under construction. All were being aided by overseas interests.

Furtherest along was the Bim Son plant about 100 kilometers south of Hanoi near the coast. This was a Soviet-aided project and a showpiece of Soviet-Vietnamese cooperation. One 600,000-ton-per-year kiln was completed in late 1981 after 46 months of construction. The second, similar production line was rescheduled at that time for a November 1982 completion. Construction continued at a slow pace and the November date was not met. In December, the Vietnamese press stated that the second kiln was expected to be completed at the end of 1983, bringing the total capacity to 1.2 million tons per year.

The Hoang Thack plant between Hanoi and Haiphong has been under construction since 1978. The 1-million-ton-per-year plant was being constructed with Danish and Japanese aid. It too was well behind the originally scheduled 1980 completion date. June of 1983 was mentioned in the Danish press as the earliest possible completion date, and cost overruns were 60 million kroner by yearend 1982. Delayed deliveries; a shortage of managers and technicians; lack of fuel, electric power, and supplies; thefts; and damage to equipment have all contributed to the slow progress.

Despite the large reported capacity of the Vietnamese cement industry of 1.5 million tons per year, there were still serious production problems. Both the Haiphong and Ha-tien plants operated well below capacity. By the end of October 1982, the new Bim Son plant produced 160,000 tons of clinker from its 600,000-ton-per-year kiln. Conflicting Vietnamese press and radio reports throughout the year indicated that plant operation was not as smooth as would be expected from a new, high-capacity plant. One reason given was that the plant was still in the breaking-in-and-testing period. Other statements indicate the actual reasons are more likely a failure of the local raw material supply system, frequent electric power shortages and stoppages, and a transportation system unable to distribute the sudden increase in volume of material. With the Bim Son capacity being doubled and two more large plants due online in 1983-84, it is difficult to see much improvement in the short-term raw material and transportation situation. Production of cement is expected to increase at an impressive percentage, but the transport and distribution problems are likely to get worse before they improve over the long term. Shortages of cement, and, in particular, problems of distributing the material that is available, are expected to continue to adversely affect the construction industry and in turn be a major constraint to the entire industrial and agricultural development program.

Fertilizer Materials.—Vietnam produced both nitrogenous and phosphate fertilizers from domestic resources. The small Ha Bac nitrogenous fertilizer factory has had difficulty meeting its production goals for several years and has never operated at a normal capacity-utilization factor. During 1982, the problems were severe enough to be mentioned in the press, a rare occurrence in Vietnam. The output was apparently less than one-third design capacity at a time when agricultural output was receiving the highest Government priority.

The phosphate industry was a major source of foreign exchange earnings before the border hostilities in 1979. Since then, exports of apatite have totally stopped or dropped to an insignificant level. The small amount of production that has been restored from the Lao Cai apatite mine has gone to one of the superphosphate plants or to one of the dozens of small apatite grinding

plants around the country. Some of these small plants also have facilities to roast the ore, thereby increasing its effectiveness as a direct-application phosphate fertilizer.

Phosphate production targets were exceeded for 1982, and more than 200,000 tons of chemical fertilizers[29] was produced. The Lam Thao superphosphate plant has been under a Soviet-sponsored refurbishing and expansion program for several years. Most of the work was apparently completed during 1982, and a high party official ordered production of 400,000 tons of fertilizer per year. The original annual capacity was 200,000 tons, a production figure never reached.

Mineral Fuels.—*Coal.*—A 5th Party Congress resolution emphasized the importance of stepping up coal production in the 1981-85 plan period. The industry was to "strive to bring the 1985 coal production to 8 million to 9 million tons." The goal amounts to an admission of failure on the part of the Government to meet a previous target. As late as mid-1979, the Ministry of Power and Coal announced a goal of 10 million tons for 1980.

The need for increased coal output was greater than ever. As a domestically produced source of energy, it substituted for expensive imported petroleum. It was also a major export item and foreign exchange earner in previous years.

Production problems, however, seem to be increasing significantly. Several new mines have been developed and old ones rebuilt and modernized, and yet goals were not met. An apparent lack of worker incentive causes a high rate of turnover in the underground mines. With fewer experienced miners to teach the newcomers, working conditions become more difficult resulting in further turnover.

The extent and productivity of mechanical equipment in open pit mines was low in 1982 by Vietnamese standards and extremely low by world standards. Maintenance reportedly was not performed on a timely basis because of a critical shortage of skilled mechanics and spare parts. This in turn led to more frequent and serious equipment breakdowns and more extended periods of downtime.

Transportation problems, which were chronic throughout the country, added to the inefficiency in the coal sector. Coal was often stockpiled at the mines for lack of truck or railroad capacity. At yearend 1982, 1.4 million tons of coal was waiting to be moved from the minesites.

Government officials admitted serious management shortcomings, and plans were developed to remedy these and other problems.

The 1983 target for overburden removal was set at 27.5 million cubic meters, nearly double that of 1982. A goal of 5.2 million tons of coal was to be extracted from open pit mines in 1983, and a total of 6.5 million for overall coal production.

Mong Duong, a new coal mine, in Quang Minh Province northeast of Hanoi, began operating in late December. Built with Soviet aid, it will have an initial capacity of 450,000 tons per year.

Oil and Natural Gas.—The Soviet Union became Vietnam's exclusive partner for oil and gas development, following the withdrawal of the last Western oil company in 1981.

Vietnam began commercial natural gas production in Thai Binh Province in mid-1981. The gas fueled the first of five 17,000-kilowatt, gas-turbine-powered generator sets. The second unit was to be installed in 1982. Press reports also indicated that some oil has been located, but no details were available.

The first offshore well was planned for 1982 as part of the joint Soviet-Vietnamese venture. The surveying and preparation for drilling took longer than planned, and the drilling platform was believed to be still under construction at yearend. The Soviets were believed to be planning their drilling from fixed platforms that would be assembled at the petroleum support base at Vung Tau southeast of Ho Chih Minh City. The platforms will be towed out to sea and sunk over favorable geologic structures. Twelve wildcat and twenty experimental development holes will be drilled. Drilling could begin by mid-1983 if no problems are encountered with the platforms.

In 1974, before the end of the hostilities in Vietnam, subsidiaries of Shell Oil Co. and Mobil Oil Corp. each reported favorable oil strikes in their concession areas off the southeast coast. Either of these sites would be logical targets for the first Vietnamese drilling effort.

The Soviet Union was also helping in the construction of a permanent petroleum products pipeline between Vinh in Nghe Tinh Province and Vientiane, the capital of Laos. The pipeline will furnish an alternative supply route for Laos, which presently must get its petroleum imports through Thailand or via expensive tanker truck through Vietnam. Progress on the Viet-

namese section of the line during 1982 consisted of surveying and site preparation. The line will have a capacity of 2.3 million barrels per year. That amount could be moved in a standard 100-millimeter or 150-millimeter pipe depending on the pumping arrangements.

[1]By Gordon L. Kinney, physical scientist, Division of Foreign Data.
[2]Bangladesh fiscal year begins July 1 of the year stated.
[3]The taka to dollar exchange rate has varied from 15.0 to 19.5 during the last decade. Where necessary, conversion was made at the rate of taka 19.5=US$1.00 during 1982.
[4]Petroleum News. V. 13, No. 11, February 1983, p. 8.
[5]By Charles L. Kimbell, senior foreign mineral specialist, Division of Foreign Data.
[6]By E. Chin, physical scientist, Division of Foreign Data.
[7]Hong Kong Government. 1982 Annual Report. 325 pp.
[8]Where necessary, values have been converted from Hong Kong dollars (HK$) to U.S. dollars at the rate of HK$6.072=US$1.00 for 1982.
[9]Hong Kong Government. Monthly Digest of Statistics. February 1983, 91 pp.
[10]By Gordon L. Kinney, physical scientist, Division of Foreign Data.
[11]By E. Chin, physical scientist, Division of Foreign Data.
[12]Where necessary, values have been converted from North Korean won (NKW) to U.S. dollars at the rate of NKW0.94=US$1.00.
[13]By Gordon L. Kinney, physical scientist, Division of Foreign Data.
[14]Far Eastern Economic Review (Hong Kong). Asia 1982 Yearbook. P. 186.
[15]SIANG PASASON (Vientiane, Laos). Dec. 20, 1982, p. 2.
[16]By John C. Wu, economist, Division of Foreign Data.
[17]Novari Mongolii (Ulaanbaatar). Jan. 21, 1983, pp. 2-3.
[18]Where necessary, values have been converted from Mongolian tugriks to U.S. dollars at the rate of 3.11 tugriks=US$1.00.
[19]Far Eastern Economic Review. V. 119, No. 47, Nov. 19, 1982, pp. 43-44.
Montsame (Ulaanbaatar). Mar. 16, 1983, p. 1.
[20]Montsame (Ulaanbaatar). Mar. 31, 1982, p. 1; July 26, 1982, p. 1; Oct. 21, 1982, p. 1.
[21]By Gordon L. Kinney, physical scientist, Division of Foreign Data.
[22]Where necessary, values have been converted from Nepalese rupees (NRs) to U.S. dollars at the rate of NRs13.2=US$1.00 during 1982.
[23]U.S. Department of State, U.S. Embassy, Kathmandu, Nepal. Foreign Economic Trends and Their Implications to the United States. November 1982, p. 2.
[24]By E. Chin, physical scientist, Division of Foreign Data.
[25]Where necessary, values have been converted from Singapore dollars (S$) to U.S. dollars at the rate of S$2.14=US$1.00.
[26]Department of Statistics (Singapore). Monthly Digest of Statistics. V. 22, No. 5, May 1983, 139 pp.
[27]By Gordon L. Kinney, physical scientist, Division of Foreign Data.
[28]Hanoi Quan Doi Nhan Dan. Nov. 4, 1981, p. 3.
[29]———. Jan. 8, 1983, p. 1.

Table 17.—Vietnam: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Principal destinations, 1981
METALS			
Antimony: Metal including alloys, all forms	10	NA	
Chromium: Ore and concentrate	9,105	7,942	All to Japan.
Tin: Metal including alloys, unwrought	5	NA	
NONMETALS			
Clays and clay products: Products:			
Nonrefractory	56	95	All to Italy.
Refractory including nonclay brick	48	177	Do.
Precious and semiprecious stones other than diamond: Natural value, thousands	--	$1	All to West Germany.
Salt and brine	249	NA	
Stone, sand and gravel: Dimension stone:			
Crude and partly worked	198	5	France 4.
Worked	1	NA	
Talc, steatite, soapstone, pyrophyllite	100	NA	
MINERAL FUELS AND RELATED MATERIALS			
Coal:			
Anthracite and bituminous	416,418	26,576	France 17,350; Italy 9,030.
Briquets of anthracite and bituminous coal	4,000	4,000	All to Thailand.
Petroleum refinery products: Kerosine and jet fuel 42-gallon barrels	120,939	NA	

[p]Preliminary. NA Not available.
[1]Owing to a lack of official trade data published by Vietnam, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

Table 18.—Vietnam: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Principal sources, 1981
METALS			
Alkaline- and rare-earth metals	--	1	All from United Kingdom.
Aluminum:			
Oxides and hydroxides	(2)	21	All from Japan.
Metal including alloys, semimanufactures	781	277	Japan 252; Belgium-Luxembourg 10.
Cobalt: Oxides and hydroxides	6	2	All from Japan.
Copper: Metal including alloys:			
Unwrought	--	6	Do.
Semimanufactures	39	221	Japan 173; Italy 40.
Iron and steel: Metal:			
Ferroalloys, unspecified	440	NA	
Semimanufactures:			
Bars, rods, angles, shapes, sections	[3]23,474	8,214	Japan 6,852; Denmark 482; Netherlands 302.
Universals, plates, sheets	6,070	8,393	Japan 7,457; France 518; Sweden 283.
Hoop and strip	501	590	Japan 584.
Rails and accessories	20	19	Japan 13; France 6.
Wire	[4]646	1,221	Japan 1,216.
Tubes, pipes, fittings	3,348	1,490	Japan 567; Sweden 291; France 281.
Castings and forgings, rough	--	6	All from France.
Manganese: Oxides	200	70	All from Japan.
Mercury, 76-pound flasks	87	NA	
Metalloids:			
Phosphorus	--	10	All from Japan.
Unspecified	2	36	All from France.
Molybdenum: Metal including alloys, all forms, kilograms	144	116	All from Japan.
Nickel: Metal including alloys, semimanufactures	[5]2	(2)	All from West Germany.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, troy ounces	--	1,360	All from Japan.
Silver: Metal including alloys, unwrought and partly wrought, value, thousands	$1	--	
Tin: Metal including alloys, semimanufactures, kilograms	22	NA	
Titanium: Oxides	100	158	All from Japan.
Tungsten: Metal including alloys, all forms, kilograms	274	372	Do.
Zinc:			
Oxides	--	77	Do.
Metal including alloys:			
Unwrought	397	2	Do.
Semimanufactures	1	2	All from Finland.
Other: Oxides and hydroxides	45	22	Japan 18.
NONMETALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	1	NA	
Grinding and polishing wheels and stones	41	36	West Germany 25; Norway 10.
Barite and witherite	3,705	NA	
Boron materials: Oxides and acids	40	NA	
Cement	76,300	75,011	U.S.S.R. 32,000; Philippines 24,900; Japan 16,964.
Clays and clay products:			
Crude:			
Bentonite	588	NA	
Kaolin	471	NA	
Unspecified	9	49	All from Sweden.
Products:			
Nonrefractory	1,657	3,585	Japan 3,577.
Refractory including nonclay brick	859	618	Japan 583; West Germany 20.
Diatomite and other infusorial earth	402	750	All from Japan.
Feldspar, fluorspar, related materials	350	NA	
Fertilizer materials: Manufactured:			
Ammonia	46	3,510	All from Japan.
Nitrogenous	314,716	348,804	U.S.S.R. 313,014; Bulgaria 32,000.
Phosphatic	--	1,000	All from Japan.
Potassic	51,211	26,734	All from U.S.S.R.
Unspecified and mixed	--	10	Sweden 8.
Gypsum and plaster	1	NA	
Halogens: Chlorine	--	(2)	All from Thailand.
Magnesium compounds: Oxides and hydroxides	--	7	All from Japan.
Mica: Worked including agglomerated splittings	12	4	Do.
Phosphates, crude	--	20	All from Sweden.
Pigments, mineral: Iron oxides and hydroxides, processed	20	3	All from Japan.
Sodium and potassium compounds, n.e.s.:			
Potassium hydroxide including sodic and potassic peroxides	17	5	Do.
Sodium hydroxide	1,507	3,001	West Germany 1,801; France 1,000.

See footnotes at end of table.

Table 18.—Vietnam: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981[p]	Principal sources, 1981
NONMETALS —Continued			
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	20	20	All from Italy.
Worked	40	NA	
Quartz and quartzite	--	26	All from Finland.
Sand other than metal-bearing	2	337	All from Sweden.
Sulfur:			
Elemental: Crude including native and by-product	--	4,000	All from Poland.
Sulfuric acid	4	19	All from Netherlands.
Talc, steatite, soapstone, pyrophyllite	352	202	All from Japan.
Other:			
Slag and dross, not metal-bearing	--	255	All from Sweden.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	NA	43	France 41.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	1	NA	
Carbon: Carbon black	600	185	All from Japan.
Coal:			
Anthracite and bituminous	31,302	NA	
Lignite including briquets	6	NA	
Coke and semicoke	7,500	2,500	All from Japan.
Hydrogen, helium, rare gases	2	([2])	All from France.
Petroleum refinery products:			
Gasoline, 42-gallon barrels	166,107	425	West Germany 417.
Mineral jelly and wax, do.	3,880	614	Japan 559; West Germany 47.
Kerosine and jet fuel, do.	6,402	1,363	All from Thailand.
Distillate fuel oil, do.	--	4,461	West Germany 3,700; Belgium-Luxembourg 761.
Lubricants, do.	[6]134,484	4,317	Japan 1,969; Sweden 896; Netherlands 826.
Bitumen and other residues, do.	111,565	60,600	All from Japan.
Bituminous mixtures, do.	12	NA	
Unspecified, do.	--	75	All from Japan.
Tars and other crude chemicals derived from coal, gas, and petroleum	8,227	8,079	Do.

[p]Preliminary. NA Not available.

[1]Owing to a lack of official trade data published by Vietnam, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

[2]Less than 1/2 unit.

[3]Excludes part of Japanese exports valued at $295,000.

[4]Excludes part of Japanese exports valued at $102,000.

[5]Excludes Japanese exports valued at $3,000.

[6]Excludes Japanese exports valued at $267,000.

The Mineral Industry of Other Near East Countries

By Peter J. Clarke[1]

CONTENTS

AFGHANISTAN

Afghanistan's mineral industry continued to be dominated by the production and export of natural gas, although several mining and related industrial projects, all under the supervision of Soviet technicians, were in the planning stage in 1982. Afghanistan produced minor quantities of barite, cement, coal, fertilizer materials, iron, and lapis lazuli, all for domestic consumption.[2] Large-scale projects being investigated were a copper mine and concentrating plant at Ainak, extensive mining of the Hajigak iron ore deposit near Kabul, construction of an oil refinery at Angot, increasing production and processing of natural gas, and implementing an intensive geologic prospecting and exploration program for areas of mineral potential.

Afghanistan's gross domestic product (GDP) was estimated at $2.76 billion[3] and has remained stagnant for the past several years. Total exports in 1982 were estimated at $700 million, only a marginal increase from the 1981 figure of $694 million. Exports of natural gas to the U.S.S.R. earned $385 million in 1982, representing just over one-half of Afghanistan's total exports. Natural gas revenues were down approximately 11% from the 1981 level, owing primarily to increased antigovernment activity in the northern part of the country.[4] About 90% of the country's natural gas production was exported to the U.S.S.R.[5] About 38% of Afghanistan's development budget had been earmarked for mining and industrial projects in 1982.[6]

Soviet technical and financial assistance continued to be concentrated on expanding production and export capacity at the natural gasfields of Khawaga Gogerdak and Jarq-aduq located in southwestern Shibarghan Province in northern Afghanistan. Overall gas production capacity increased 65% with the start of commercial flow from the Jarq-aduq Field early in the year. Jarq-aduq is capable of producing close to 200 million cubic feet per day from four gas zones between 2,980 and and 8,270 meters in the Jurassic and Lower Cretaceous.

The field, with natural gas reserves estimated at 1 trillion cubic feet, is high in hydrogen sulfide and carbon dioxide. The Soviets have recently installed a desulfurization and processing plant to make the gas

suitable for industrial uses and for export. Most of the gas from Jarq-aduq was exported by pipeline to the U.S.S.R., but a significant quantity was thought to be delivered to the nitrogen fertilizer facility and powerplant at Mazar-i-Sharif, east of Shibarghan, through a spur gasline.

The Gogerdak Field, located 20 kilometers from Jarq-aduq, has been producing gas since the mid-1960's. Reserves were estimated at 1.45 trillion cubic feet, 800 billion cubic feet of sweet gas from an upper horizon, and 650 billion cubic feet of sour gas from a lower horizon. The export pipeline, a 100-kilometer-long, 81-centimeter-diameter pipe, runs from Gogerdak across the Amu Darya River into the U.S.S.R. A new compressor station was scheduled to be built to accommodate increased gas supplies from Jarq-aduq.[7]

Although Afghanistan does have documented reserves of petroleum totaling 70 million barrels according to a 1978 International Bank for Reconstruction and Development (World Bank) study, no crude oil has been produced in the country. Recent reports of a planned oil refinery at Angot, site of a known petroleum concession, may indicate the beginning of crude oil production.[8] Afghanistan has received its domestic requirement of petroleum products from the U.S.S.R.

Afghanistan's second most important energy resource was coal. Production of coal from the Karkar, Ishpushta, and Darra-i-Suf Mines totaled approximately 60,000 tons in 1982. The Karkar and Ishpushta Mines, the country's oldest, were located in northern Afghanistan, near Pul-i-Khumri and Doab, respectively. Most of the country's production came from the Darra-i-Suf Mine, located 160 kilometers south of Mazar-i-Sharif. The Darra-i-Suf Mine contains 60 million tons of good-quality coal, some of which is suitable for coking. Coal production has rebounded considerably from the immediate postinvasion period but remains below the pre-1978 average.

The largest nonfuel mineral project being planned was the $600 million copper mine and smelter to be located at Ainak, south of Kabul in Logar Province. The Ainak deposit contained approximately 280 million tons of 0.7% to 1.5% copper ore. Machinoexport of the U.S.S.R. was doing preliminary infrastructure work in 1982 for possible commercial production in 1985. The mine and mill was planned to produce 114,000 tons of copper concentrates annually. A smelter was reportedly under construction near Kabul, along with a 17-kilometer road linking the smelter to the mines at Ainak.[9]

Also planned for possible exploitation on a large scale in 1982 was the Hajigak iron ore deposit in the Hindu Kush Mountains, 100 kilometers northwest of Kabul. The deposit contains an estimated 1.7 billion tons of mixed hematite and magnetite iron ore grading 62% iron. A 1977 independent survey concluded that the deposit was large enough and of a sufficient grade to support a major iron and steel industry, although no specific plans to develop the deposit have been put forward by the Afghan authorities.[10] Other minerals being produced on a small scale include cement, barite, marble, fertilizer materials, and semiprecious stones. Production of cement totaled about 120,000 tons in 1982, most of which was produced at the Ghori cement factory. Other plants operating in the country were the Jabel Saraj plant, and a newly completed 210,000-ton-per-year plant in Harat. Capacities at Ghori and Jabel Saraj were 120,000 tons per year and 30,000 tons per year, respectively.

The Sangilyan barite mine, located 65 kilometers northwest of Harat, produced a small quantity of barite. Barite production averaged about 12,000 tons per year in the 2 years prior to the Soviet invasion. The measured and indicated ore reserves of the deposit were 867,000 tons averaging 87.5% $BaSO_4$. Inferred reserves were 310,000 tons containing 81% $BaSO_4$. A recently completed mine road to Harat indicates possible expansion of the mine over the next several years, especially as Afghan oil and gas drilling and exploration increases.

Precious and semiprecious stones were at one time a major industry in Afghanistan, as the country produced 80% of the world's supply of lapis lazuli. Production of this sodalite group mineral from Sare-Sang, a remote area in the high ranges of the Hindu Kush Mountains, has dropped to near zero since the Soviet invasion, although small unreported quantities were possibly being produced.

Other minerals that were produced prior to the Soviet invasion, for which a current status was unavailable, include asbestos, gypsum, rock salt, and talc. Mineral deposits that have been investigated and may hold potential for future development include the Logar Valley chromite deposits, the Bibi Guahar area lead-zinc deposits, the Zarkashan gold deposit, and the Pansher emerald occurrences, along with smaller deposits of fluorspar, magnesite, sulfur, and uranium.

Table 1.—Other countries of the Near East: Production of mineral commodities[1]

Country and commodity	1978	1979	1980	1981[p]	1982[e]
AFGHANISTAN[2]					
Asbestos—metric tons	[e]13,000	4,000	--	--	NA
Barite—do.	12,930	3,000	3,000	1,000	2,000
Cement, hydraulic—do.	127,000	140,000	[e]50,000	95,000	120,000
Coal, bituminous—do.	212,725	100,000	--	50,000	60,000
Gas, natural:					
Gross—million cubic feet	90,000	70,000	[e]70,000	97,500	110,000
Marketed—do.	81,824	60,000	[e]60,000	79,000	89,000
Gem stones: Lapis lazuli—kilograms	1,984	6,000	--	--	NA
Gypsum—metric tons	6,648	--	--	--	NA
Natural gas liquids—thousand 42-gallon barrels	[e]10	10	[e]5	[e]5	34,000
Nitrogen: N content of ammonia[e]—metric tons	25,000	25,000	10,000	36,000	10,000
Salt, rock—do.	81,112	20,000	[e]5,000	[e]6,000	NA
Talc—do.	1,775	500	--	--	NA
BAHRAIN					
Aluminum metal: Primary, smelter—do.	122,800	126,000	126,152	141,000	[3]170,960
Gas, natural:					
Gross—million cubic feet	131,150	143,449	123,442	122,000	[3]130,507
Marketed—do.	91,805	102,950	97,468	78,059	[3]91,373
Natural gas liquids:					
Butane—thousand 42-gallon barrels	NA	485	[r]875	817	[3]890
Propane—do.	NA	NA	[r]1,000	1,028	[3]986
Naphtha—do.	NA	NA	986	1,170	[3]1,139
Petroleum and refinery products:					
Crude—do.	20,190	18,741	18,338	16,902	[3]16,067
Refinery products:					
Gasoline—do.	11,099	9,249	8,869	11,173	[3]10,068
Jet fuel—do.	11,756	11,803	13,797	13,456	[3]8,341
Kerosine—do.	912	868	547	2,617	[3]2,676
Distillate fuel oil—do.	23,988	23,574	20,586	25,270	[3]19,515
Residual fuel oil—do.	29,373	30,640	27,046	28,648	[3]19,866
Lubricants—do.	379	130	375	22	[3]363
Other—do.	10,939	13,201	[e]12,300	12,615	[3]9,975
Refinery fuel and losses—do.	1,507	2,245	[e]2,100	2,177	[3]1,534
Total—do.	89,953	91,710	[e]85,620	95,978	[3]72,338
Sulfur, byproduct of petroleum—metric tons	25,909	25,148	32,559	36,000	[3]34,060
LEBANON[2]					
Cement, hydraulic—thousand metric tons	1,381	2,122	[e]2,200	2,391	1,500
Gypsum—metric tons	11,000	9,750	10,000	9,500	5,000
Iron and steel:					
Steel, crude—thousand metric tons	6	--	--	--	--
Semimanufactures—do.	250	220	[e]220	185	150
Lime[e]—do.	101	120	120	61	50
Petroleum refinery products:					
Gasoline—thousand 42-gallon barrels	4,019	3,498	[e]3,400	[e]3,000	2,400
Jet fuel—do.	1,019	923	[e]900	[e]600	400
Kerosine—do.	144	175	[e]150	[e]100	50
Distillate fuel oil—do.	2,354	2,609	[e]2,600	[e]2,400	2,000
Residual fuel oil—do.	4,367	5,237	[e]5,000	[e]4,300	3,800
Liquefied petroleum gas—do.	--	361	[e]300	[e]300	200
Unspecified—do.	151	212	[e]200	[e]200	150
Refinery fuel and losses—do.	724	887	[e]800	[e]600	500
Total—do.	12,778	13,902	[e]13,350	11,500	9,500
Salt[e]—thousand metric tons	12	10	12	15	10
OMAN					
Gas, natural:					
Gross—million cubic feet	[e]130,000	[e]122,000	[e]117,000	174,835	188,000
Marketed—do.	[e]5,500	17,657	21,189	45,000	48,000
Marble—thousand metric tons	--	--	--	[e]20	[3]50
Natural gas liquids:					
Butane—thousand 42-gallon barrels	500	[r e]30	[r e]40	[3]46	50
Propane—do.		[r e]4	[r e]5	[3]5	5
Natural gasoline—do.		[r e]450	[r e]600	[3]730	800
Petroleum, crude—do.	114,975	107,845	103,528	119,808	[3]122,598
Sand and gravel—thousand metric tons	NA	NA	102	[r e]800	[3]1,343
Stone, unspecified—do.	NA	NA	329	[r e]3,000	[3]6,220
QATAR[2]					
Cement, hydraulic—do.	208	237	209	258	[3]252
Gas, natural:					
Gross—million cubic feet	164,212	235,795	224,000	222,000	190,000
Marketed—do.	52,230	154,041	79,935	94,250	95,000

See footnotes at end of table.

Table 1.—Other countries of the Near East: Production of mineral commodities[1] —Continued

Country and commodity	1978	1979	1980	1981[p]	1982[e]
QATAR[2] —Continued					
Iron and steel semimanufactures thousand metric tons	86	350	450	455	[3]475
Natural gas liquids thousand 42-gallon barrels	--	77	[e]265	6,126	[3]6,516
Nitrogen: N content of ammonia -- metric tons	166,000	303,400	418,000	366,612	[3]434,016
Petroleum and refinery products:					
Crude ------ thousand 42-gallon barrels	176,537	184,772	172,554	146,370	[3]120,289
Refinery products:					
Gasoline ------ do	796	921	[e]950	1,144	[3]1,010
Jet fuel ------ do	455	512	450	480	[3]478
Kerosine ------ do	38	31	33	33	[3]32
Distillate fuel oil ------ do	908	939	[e]1,000	1,764	[3]1,320
Other ------ do	72	[e]75	[e]75	75	75
Refinery fuel and losses and partly finished oil ------ do	1,439	1,500	[e]1,500	1,500	[3 4]1,086
Total ------ do	3,708	3,978	4,008	4,996	4,001
Stone: Limestone ---- thousand metric tons	3,103	3,000	2,036	2,300	[3]2,185
Sulfur ------ metric tons	--	--	--	5,600	5,475
SYRIA					
Asphalt, natural ----- thousand metric tons	35	83	89	90	71
Cement, hydraulic ------ do	1,433	1,847	1,995	2,150	2,850
Gas, natural:					
Gross[e] ------ million cubic feet	56,500	60,000	60,000	55,000	52,000
Marketed ------ do	[e]7,500	[e]7,500	[e]7,000	[e]8,000	9,000
Gypsum ------ metric tons	[e]86,000	63,500	78,636	79,545	80,000
Iron and steel: Steel, crude thousand metric tons	[r]132	[r]110	110	110	99
Nitrogen: N content of ammonia -- metric tons	19,000	75,888	48,300	[e]120,000	180,000
Petroleum and refinery products:					
Crude ------ thousand 42-gallon barrels	62,500	68,709	60,656	58,990	55,625
Refinery products:					
Gasoline ------ do	4,675	4,745	5,073	4,818	5,255
Kerosine and jet fuel ------ do	3,023	2,920	3,650	4,051	4,400
Distillate fuel oil ------ do	8,355	6,935	18,980	30,998	32,000
Residual fuel oil ------ do	8,924	10,585	10,950	14,231	17,700
Liquefied petroleum gas ------ do	464	1,825	657	1,423	1,500
Asphalt ------ do	1,889		1,497	2,227	2,250
Refinery fuel and losses ------ do	--	730	1,241	1,752	1,800
Total ------ do	27,330	27,740	42,048	59,500	64,905
Phosphate rock ------ thousand metric tons	[e]750	1,272	1,319	1,321	[3]1,455
Salt ------ do	[e]110	75	90	90	[3]102
Stone, sand and gravel:					
Stone: Dimension, marble --- cubic meters	[e]50,000	71,562	84,860	60,000	[3]20,000
Sand and gravel ------ do	12,500	[r]19,675	[r]19,462	20,000	205,000
Sulfur, byproduct of petroleum and natural gas thousand metric tons	[e]6	[e]6	[e]5	3	[3]22
PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN					
Petroleum refinery products:					
Gasoline ----- thousand 42-gallon barrels	850	[e]1,000	[e]1,000	[e]1,800	2,000
Jet fuel ------ do	1,280	1,200	[e]1,200	[e]2,000	2,300
Kerosine ------ do	775	[e]800	[e]800	[e]1,200	1,500
Distillate fuel oil ------ do	[e]2,000	[e]2,500	[e]2,500	[e]3,000	3,500
Residual fuel oil ------ do	[e]6,000	[e]6,000	[e]6,000	[e]12,000	13,000
Other ------ do	[e]700	[e]800	[e]800	[e]1,200	1,500
Refinery fuel and losses ------ do	[e]869	[e]870	[e]870	[e]1,000	1,200
Total ------ do	[e]12,474	[e]13,170	[e]13,170	[e]22,200	25,000
Salt[e] ---- thousand metric tons	75	80	80	75	75
YEMEN ARAB REPUBLIC[2]					
Cement ---- thousand metric tons	63	90	81	80	[3]237
Gypsum ------ metric tons	NA	NA	NA	[e]20,000	[3]21,923
Salt[e] ---- thousand metric tons	30	90	65	65	[3]57

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Sept. 1, 1983.

[2]In addition to the commodities listed, a variety of other crude construction materials (clays, stone, and sand and gravel) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Diesel oil only.

BAHRAIN

Bahrain's primary petroleum production and processing industry did not fare well in 1982 as output of domestically produced crude oil declined 5% and refinery output declined 25% from their respective 1981 levels. The decline in production and prices for crude and refined petroleum led to a substantial drop in Bahrain's export revenues, from $3.89 billion in 1981 to $3.15 billion in the current year.[11] Petroleum revenues accounted for 87% of the country's total foreign exchange receipts and about 70% of the GDP, estimated at $5.7 billion.

Despite the downturn in the petroleum sector, the Bahraini Government continued to move forward with plans to diversify the financial and industrial base of the country. Among the projects planned to lead Bahrain into a post-oil economy were an expanded aluminum industry, a major iron ore pelletizing plant, and a heavy oil hydrocracking plant. Also expected to be an economic boost in the latter half of the decade was the Saudi-Bahrain Causeway, under construction in 1982, which will link Saudi Arabia and Bahrain by 1986, providing new markets and cheaper transportation for the island nation's inhabitants.

Bahrain's economy has weathered the soft oil market considerably better than some of its Arabian Gulf neighbors. Bahrain's oil income is derived from exporting its domestically produced crude oil and refined products, and also from crude oil exported from the Abu Sa'fah Field, located offshore north of Bahrain. Abu Sa'fah is owned and operated by Saudi Arabia's Petroleum and Minerals Organization (Petromin), but revenues from the field are divided evenly between Bahrain and Saudi Arabia. Revenues from oil and other sources are disbursed according to rigid biennial budgets, which conform to a 6-year development program. This program was stretched from 4 to 6 years in 1982 because of the limited capital absorptive capacity of the economy. Of the $580 million budgeted expenditure for 1982, only $435 million was actually spent, leaving the country with an adequate cushion to protect against further revenue declines.

Production of crude oil from Bahrain's only oilfield, the onshore Awali Field, declined from 46,300 barrels per day in 1980 to 44,000 barrels per day in 1982. Awali production, which began in June 1932, peaked at 77,000 barrels per day in 1977 and has declined rapidly since then. Remaining recoverable reserves in the field were estimated at 430 million barrels, and at the current rate of production, would be exhausted in 25 years. In an attempt to stem the tide of declining oil production, the Bahrain National Oil Co. (Banoco), owned by the Government, was planning to conduct an offshore exploratory drilling program, scheduled to begin early in 1983. The drilling was to be based on the result of a $14 million offshore seismic survey that covered 5,764 square kilometers. The survey, which also covered Kuwait offshore territorial waters, was completed in 1982 and was conducted by Western Geophysical Co. of the United States under a contract awarded by Banoco and the Kuwait Oil Co. in January 1981.

In January 1982, Banoco formally assumed full responsibility for management and operation of all oil production facilities as well as offshore exploration and development. These duties had previously been shared with the Bahrain Petroleum Co. Ltd. (BAPCO), a subsidiary of California-Texas Petroleum Corp. (Caltex), owned jointly by the Standard Oil Co. of California and Texaco Inc., both of the United States. Caltex was responsible for developing the oil industry in Bahrain in the early 1930's and has since cooperated in the orderly transfer of ownership of most of the industry to the Bahraini Government. Caltex's primary remaining asset in the country was a 40% share in the Bahrain Petroleum Co. BSC (BAPCO BSC), which operated the 250,000-barrel-per-day Sitra refinery, Bahrain's only refinery. The remaining 60% share was held by the Government. Output from the refinery averaged 198,200 barrels per day in 1982, down 25% from the previous year's level. Bahrain's domestic crude oil production, even at its peak, could only supply 30% of the refinery's capacity. For the past several years, Bahrain has imported an average of 200,000 barrels per day of Arabian light crude from Saudi Arabia. Part of this supply comes from the Abu Sa'fah Field, which produced about 70,000 barrels per day in 1982, well below its 120,000-barrel-per-day capacity. A total of 54,868,480 barrels of Saudi crude was processed at Sitra during the year, along with 16,039,300 barrels of Bahraini oil and

1,140,300 barrels of other stocks. Refinery output was reduced considerably owing to weakened demand for petroleum products worldwide, and also owing to the high cost of importing Saudi crude, which remained at the $34 per barrel mark throughout the year. Only about 3% of the refinery's full capacity is consumed in Bahrain, with the remaining 97% available for export.

Nearing completion at the Sitra refinery was a $29 million light isomate production unit, designed to convert low-value fuel oil feedstock into lighter and higher value diesel oil. Ralph M. Parsons Co. of the United States was handling construction of the unit, which was to be completed by March 1983.

Bahrain's largest refining project, the Heavy Oil Conversion Co. (HOCC), was in the feasibility study stage in 1982. The company was a joint venture of Banoco (40%), the Kuwait National Petroleum Co. (30%), and Saudi Arabia's Petromin (30%). The $1 billion hydrocracking facility was to convert heavy fuel oil feedstock into lighter products such as naphtha, kerosine, diesel fuel, and jet fuel. The heavy oil feedstock was to be supplied from refineries in Bahrain, Kuwait, and Saudi Arabia. HOCC was formed in December 1981, and in July 1982, a $400,000 contract for the feasibility study was signed with C. E. Lummus of the United States.

A second petroleum related project was under construction in 1982: the Gulf Petrochemical Industries Co. (GPIC) methanol and ammonia plant at Sitra, located adjacent to the refinery. The project, an evenly shared joint venture of Bahrain, Saudi Arabia, and Kuwait, was expected to produce 1,000 tons per day of ammonia and 1,000 tons per day of methanol utilizing natural gas feedstock. Uhde GmbH of the Federal Republic of Germany was contracted to supply engineering services and process technology, and Snamprogetti S.p.A. of Italy was awarded the $80 million construction contract for the facility. The plant was scheduled to go onstream in 1984.

Production and use of natural gas increased an average of 12% from the 1981 level, as the Bahrain Government continued to focus on gas as its energy resource of the future. With associated gas production falling in line with the steady drop in crude oil output, exploration and development of nonassociated gas from the Permian Khuff Formation led to an overall rise in gas output in 1982. During the year, Banoco had 11 operating gas wells in the Khuff zone producing a total of about 337 million cubic feet per day. With two major gas-based industries scheduled to come onstream within the decade; GPIC's ammonia-methanol plant, and the Arab Iron and Steel Co.'s (AISCO) iron ore pelletizing plant, total gas demand was expected to reach 1.2 billion cubic feet per day by 1990. To cope with the increase, Banoco awarded a $4 million contract to Compagnie Générale de Geophysique of France for deep seismic surveys into and below the Khuff zone. Sante Fe International, a subsidiary of the Kuwait National Petroleum Corp., was also contracted to drill six wells into or beneath the Khuff zone for development and testing purposes. The wells were to go as deep as 6,450 meters. Drilling under the $8 million contract was to be completed by late 1983.

Bahrain's estimated gas consumption by use was as follows, with capacity expressed in million cubic feet per day:[12]

Consumer	Consumption	
	Average	Peak
Electricity production	365	643
Oilfield uses	195	195
Aluminum Bahrain	165	170
Petroleum refining	105	113
Gulf Petrochemical Industries Co.	80	80
Arab Iron and Steel Co. (committed)	25	34
Other	65	65
Total	1,000	1,300

Most of Bahrain's current output of associated gas is utilized in the Bahrain National Gas Co.'s (Banagas) natural gas liquids (NGL) processing plant at Jabal. The plant, which began exporting NGL in 1980, was capable of producing 80,000 tons per year of propane, 79,000 tons per year of butane, and 125,000 tons per year of naphtha. Production was near capacity in 1982. In addition to producing NGL for export, tail gas or lean residue gas from the plant was pipelined to the Aluminum Bahrain (ALBA) smelter, where it supplied 80% of the plant's energy requirements. The remaining 20% was supplied by nonassociated Khuff gas. Caltex was responsible for overseas sales of NGL, while Banoco handled domestic distribution. Banagas was a joint venture of Banoco (75%), Caltex (12.5%), and the Arab Petroleum Investments Corp. (12.5%).

Aluminum production from ALBA reached its highest level ever in 1982, following completion of a $120 million expansion

project in 1981, raising capacity from 125,000 to 170,000 tons per year through the addition of a fifth and sixth potline. ALBA was owned 57.9% by the Bahraini Government, 20% by Saudi Arabia, 17% by Kaiser Aluminum Bahrain of the United States, and 5.1% by Breton Investments of the United Kingdom.

In contrast to the record output of ALBA, the Bahrain Aluminum Co. (BALCO), the joint Bahraini-Saudi marketing company for ALBA, posted an estimated $30 million loss in 1982 owing to the weak aluminum market and low prices. ALBA reportedly was maintaining a stockpile of unsold production totaling over 80,000 tons.

Breton and Kaiser, the minority shareholders in ALBA, were responsible for marketing their share of the output, while BALCO handled international sales for the two Governments. Some of this output was delivered to the Bahrain Aluminum Extrusion Co., owned by the Bahraini Government, while a substantial portion was sold to two Arabian Gulf cable manufacturers. Midal Cables, a private Bahraini-based company, produces aluminum rod from hot metal fed directly from the smelter. In 1982, 29% of Midal's stock was purchased by the Saudi Cable Co. of Saudi Arabia, which purchases the rod from Midal for conversion to aluminum wires and cables.

The largest venture to be planned around ALBA was the Gulf Aluminum Rolling Mill Co., a project of the Gulf Cooperation Council (GCC), composed of Bahrain, Kuwait, Saudi Arabia, and Iraq (20% each), and Oman and Qatar (10% each). The project was intended to produce 40,000 tons of rolled and semifinished aluminum products, mainly for the regional market. Bids on the $100 million project were being submitted in 1982, and the contract was to be awarded in 1983. Kaiser Engineers and Contractors of the United States were the project consultants.

Site preparation was completed and initial construction work began on AISCO's 4-million-ton-per-year iron ore pelletizing plant being built on reclaimed land adjacent to the Arab Shipbuilding and Repair Yard. Kobe Steel Ltd. of Japan was awarded the primary $204 million turnkey contract for construction of the pellet plant and associated facilities, which include a 100-megawatt powerplant, a 3,000-cubic-meter-per-day desalinization plant, and a 485-meter-long jetty for unloading ore and loading pellets for export. The plant was designed to produce pellets for the gulf's three major direct-reduction-based steelworks at Jubail in Saudi Arabia, Iraq, and Qatar. Insufficient committments from these steelmakers, however, has led Bahrain to consider constructing a 2-million-ton-per-year direct-reduction plant of its own to utilize a large portion of the available pellets. Plans for Bahrain's direct-reduction plant remained tentative, however, for fear of creating a dispute with Saudi Arabia, whose as yet unfinished 800,000-ton-per-year steelworks at Jubail was less than 50 kilometers away.[13] The pellet plant was scheduled for completion in 1984.

Table 2.—Bahrain: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	50	42	--	Pakistan 40.
Metal including alloys:				
Unwrought	77,546	74,793	294	Japan 30,974; Iraq 25,000; Australia 2,147.
Semimanufactures	3,711	2,069	--	Qatar 729; Kuwait 661; Saudi Arabia 317.
Copper:				
Ore and concentrate	120	34	--	United Arab Emirates 1.
Metal including alloys, unwrought and semimanufactures	2	59	--	Saudi Arabia 4; ship stores 55.
Iron and steel: Metal:				
Scrap	2,056	673	--	Pakistan 360; Saudi Arabia 50.
Steel, primary forms	112	586	12	Ship stores 574.
Semimanufactures:				
Universals, plates, sheets	777	1,604	--	United Arab Emirates 1; ship stores 1,603.
Wire	1	--		
Tubes, pipes, fittings	5,283	11,048	2	Saudi Arabia 245; Qatar 25; ship stores 10,764.

Table 2.—Bahrain: Exports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS —Continued				
Lead: Metal including alloys, unwrought and semimanufactures	--	20	--	Republic of Korea 3; ship stores 16.
Zinc: Metal including alloys, unwrought and semimanufactures	1	--		
Other:				
Oxides and hydroxides	--	6	--	Saudi Arabia 4.
Base metals including alloys:				
Scrap	14	6	--	All for ship stores.
Unwrought and semimanufactures	1	2	--	Do.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	1	2	--	Do.
Cement	1,855	34,023	--	West Germany 12; United Arab Emirates 1; ship stores 34,009.
Clays and clay products: Products, nonrefractory	48	10	--	United Arab Emirates 7.
Lime	578	591	--	Saudi Arabia 256; United Arab Emirates 247; Qatar 34.
Salt and brine	--	10	--	All for ship stores.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	9	--		
Worked	74	3	--	Qatar 2.
Gravel and crushed rock	(1)	30	--	Mainly to United Arab Emirates.
Limestone other than dimension	2	--		
Other:				
Crude	8	--		
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	9	--	Mainly for ship stores.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum and refinery products:				
Crude				
thousand 42-gallon barrels	19,672	NA		
Refinery products:				
Liquefied petroleum gas do	1,700	--		
Gasoline do	7,631	--		
Kerosine and jet fuel do	24,731	(1)	--	Mainly to Oman.
Distillate fuel oil do	23,892	1	--	Do.
Lubricants do	234	3	(1)	Mainly for ship stores.
Residual fuel oil do	25,572	(1)	--	All for ship stores.
Bitumen and other residues do	1,880	(1)	--	Mainly to Qatar.

NA Not available.
[1]Less than 1/2 unit.

Table 3.—Bahrain: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	8	--	Portugal 5; Australia 1.
Metal including alloys:				
Unwrought	104	132	96	United Kingdom 30; Saudi Arabia 4; China 1.
Semimanufactures	97,812	903	45	Belgium-Luxembourg 168; United Kingdom 131; Japan 92.
Copper:				
Ore and concentrate	500	10,505	--	Japan 10,500; Singapore 1; United Kingdom 1.
Metal including alloys, unwrought and semimanufactures	1,336	763	46	United Kingdom 279; Australia 189; Japan 75.

Table 3.—Bahrain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	2,410	1,626	--	Japan 78; United Kingdom 45; Qatar 19.
Pig iron, cast iron, related materials	771	835	--	West Germany 711; Norway 41; United Kingdom 39.
Steel, primary forms	35,939	31,789	3	Republic of Korea 8,955; Spain 3,626; Qatar 1,749.
Semimanufactures:				
Universals, plates, sheets	17,193	16,181	549	Japan 8,342; Belgium-Luxembourg 3,876; Republic of Korea 1,647.
Wire	1,518	755	(1)	West Germany 282; Singapore 150; Japan 128.
Tubes, pipes, fittings	24,887	32,814	1,419	Saudi Arabia 8,957; Japan 7,525; Netherlands 542.
Lead: Metal including alloys, unwrought and semimanufactures	28	37	--	Republic of Korea 35; United Kingdom 1.
Nickel: Metal including alloys, unwrought and semimanufactures value, thousands	$73	$5	$2	United Kingdom $3.
Silver: Metal including alloys, unwrought and partly wrought do.	$359	$9	--	France $7: United Kingdom $2.
Tin: Metal including alloys, unwrought and semimanufactures do.	$8	$2	--	Republic of Korea $1; United Kingdom $1.
Zinc: Metal including alloys, unwrought and semimanufactures	76	198	76	United Kingdom 72; Australia 29; Denmark 19.
Other:				
Oxides and hydroxides	313	98	--	United Kingdom 38; Netherlands 23; Italy 18.
Base metals including alloys:				
Scrap	579	12	--	United Arab Emirates 6.
Unwrought and semimanufactures	183	183	20	United Kingdom 85; Norway 40; Sweden 20.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	20	261	(1)	United Kingdom 206; Republic of Korea 24; Italy 21.
Asbestos, crude	(1)	--	--	
Cement	179,787	244,739	136	Republic of Korea 93,157; Australia 66,621; Japan 33,841.
Clays and clay products:				
Crude	40	268	--	Japan 210; China 28; United Kingdom 27.
Products:				
Nonrefractory	9,406	9,156	100	Spain 3,367; Italy 2,437; United Kingdom 1,775.
Refractory including nonclay brick	4,636	2,151	97	United Kingdom 1,282; Denmark 398; West Germany 129.
Diamond: Gem, not set or strung value, thousands	$146	$1	--	NA.
Fertilizer materials:				
Crude, n.e.s	170	--	--	
Manufactured, unspecified and mixed	--	911	8	West Germany 350; Belgium-Luxembourg 349; United Kingdom 88.
Gypsum and plaster	3,588	11,595	44	Republic of Korea 11,300; Cyprus 143; Singapore 52.
Lime	433	136	--	Saudi Arabia 100; Republic of Korea 18; United Kingdom 18.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$80	$79	$13	United Kingdom $15; Pakistan $13; Austria $12.
Synthetic do.	$46	$65	$26	Austria $21; India $3; Japan $3.
Salt and brine	1,433	1,294	30	Netherlands 652; Spain 220; Hong Kong 184.

See footnotes at end of table.

Table 3.—Bahrain: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	824	8,825	--	United Arab Emirates 8,020; Italy 74; Spain 1.
Worked	27,511	37,395	--	United Arab Emirates 35,238; Italy 1,835; Qatar 70.
Gravel and crushed rock	284,765	478,133	5	United Arab Emirates 474,469; Saudi Arabia 2,516; Italy 1,011.
Sand other than metal-bearing	113	187	(1)	India 100; Netherlands 52; West Germany 28.
Other:				
Crude	117	3,079	--	United Arab Emirates 3,012; Netherlands 41; Republic of Korea 25.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	3,402	4,399	2	India 1,291; United Arab Emirates 890; Kuwait 811.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	11	5	--	All from United Kingdom.
Coal: All grades including briquets and coke	34	147	4	Sweden 72; Qatar 38; United Arab Emirates 20.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	70,595	(1)	(1)	
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	244	70	69	United Arab Emirates 1.
Gasoline do	536	128	(1)	Mainly from Belgium-Luxembourg.
Mineral jelly and wax do	31	39	39	
Kerosine and jet fuel do	341	1,914	1,410	Netherlands 310; Belgium-Luxembourg 170; United Kingdom 23.
Distillate fuel oil do	1,015	7	3	United Kingdom 3.
Lubricants do	52,731	45,395	1,932	United Arab Emirates 21,140; Singapore 6,160; United Kingdom 5,467.
Residual fuel oil do	1,712	(1)	--	All from Netherlands.
Bitumen and other residues do	574,015	825,160	677,490	West Germany 119,509; Australia 18,295; Italy 3,060.

NA Not available.
[1]Less than 1/2 unit.

LEBANON

Lebanon's mineral industry, which consisted of the production of refined petroleum products, cement, lime, gypsum, salt, and semimanufactured steel products, continued to be disrupted by the political uncertainty and military activity in the country in 1982. Substantial efforts were made toward the end of the year by the Lebanese and the Israelis to repair and reopen some of the industries, notably the two petroleum refineries at Zahrani and Tripoli.

Lebanon's economy, noted for its resilience, appeared capable of sustaining a small recovery early in the year as industrial exports in the first quarter increased 9.6% over the same period in 1981. The outbreak of war in midyear brought the recovery to a halt, however, as most of the country's revenue sources dried up. Customs receipts, which previously had provided close to 50% of the Government's revenues, declined 7.5% to $108 million[14] from the already depressed 1981 level, representing the worst performance in over 5 years. The Beirut Chamber of Commerce and Industry estimated that the loss of export revenues due to the war amounted to $340 million during the year. Total exports in 1982 were estimated at $820 million, down 37% from the 1981 level.[15] Exports consisted mainly of construction materials, agricultural products, chemicals and textiles, and

were directed toward regional markets. Lebanon's leading trading partners in 1982 were Saudi Arabia and Iraq; the Saudi position was maintained because of its petroleum supply contract for Lebanon's petroleum refineries.

Lebanon's two petroleum refineries, the Mediterranean Refining Co.'s (Medreco) refinery in Zahrani, near Sidon, and the Government-owned Tripoli refinery in northern Lebanon, were both affected by supply disruptions and equipment damage, and operated only intermittently. The 17,000-barrel-per-day Medreco refinery, owned 50% by Mobil Oil Corp. and 50% by Caltex, both of the United States, sustained the worst war damage, which destroyed the pipelines, pumps, and storage tanks around the plant. The core of the refinery, the cracking unit, reportedly remained intact.[16] The refinery operated for a few months early in the year, then was closed from June to November owing to the damage, but resumed operations late in November, albeit at a reduced rate. The refinery, which previously supplied 30% to 40% of the country's domestic requirements, had been receiving its crude oil feedstock from Saudi Arabia via the Trans Arabian Pipeline Co. (TAPline), but the flow was stopped in June owing to damage to the line. The refinery was able to resume operations in November when 50,000 barrels of Saudi crude was delivered via tanker. TAPline, which did not resume operations in 1982, decided that it would permanently discontinue its operations in Lebanon, including deliveries to the refinery and exports from the Zahrani terminal on the Mediterranean coast, effective March 1983. TAPline losses, estimated at $250 million since 1975, resulted in the decision to close the 1,200-kilometer, 500,000-barrel-per-day line running from Saudi Arabia's Eastern Province to Zahrani. Closure of the line would result in the dismissal of 110 TAPline personnel in Lebanon.

The Tripoli refinery, located north of Beirut and away from the center of the conflict, was able to operate with only limited interruptions in 1982. Crude oil feedstock had been supplied by TAPline and then transported via tanker to Tripoli, but closure of TAPline nearly coincided with the reopening of the Iraq Petroleum Co. (IPC) pipeline from Kirkuk, Iraq, through Baniyas, Syria, to Tripoli. The Tripoli spur of the line reopened late in 1981, but was also subject to intermittent sabotage during the year. The IPC pipeline's maximum capacity was 400,000 barrels per day, but 1982 throughput averaged about 50% of the design capacity. The Tripoli refinery had a capacity of 35,000 barrels per day, which supplied about 60% of the domestic requirement. Because of the shortfall in output from the Zahrani refinery, the Lebanese Government was forced to import a significant quantity of petroleum products, incurring a large deficit in the public budget.

Lebanon's nonfuel mineral sector, while not escaping damage entirely, did fare somewhat better than the petroleum industry. Lebanon's three cement plants; the Société des Ciments Libanais, Cimenterie Nationale S.A.L., and Société Libanais des Ciments Blanc, were all located in Chekka, north of Beirut. Capacity of the plants was 1.8 million tons per year, 1 million tons per year, and 160,000 tons per year, respectively. Gypsum and limestone for the plants were quarried domestically. Lebanon also had three operating steel plants, the largest of which was Consolidated Steel Lebanon S.A.L. in Bablos-Amchit, which had an annual capacity of 180,000 tons of reinforcing bars and 60,000 tons of steel sections. In Tripoli, the Lebanon Steel Mill Co. operated a 100,000-ton-per-year electric arc furnace and mill that produced reinforcing bars, and Société Nationale des Tubes S.A.L. produced a limited quantity of galvanized pipe. Steel production in Lebanon was below 50% of national capacity. In addition to those products, small quantities of salt, lime, and other natural crude construction materials were also produced.

OMAN

Despite a sharp decline in petroleum revenues, Oman's heavily oil-based economy continued to grow, although at a considerably more modest rate than in the previous 2 years. Highlights in the petroleum and mineral sector included the commissioning of the Sohar copper mine and smelter and the opening of Oman's first oil refinery at Mina-al-Fahal.

New oil discoveries in southern Oman reversed a 4-year declining production trend in 1981 and 1982. However, petroleum revenues shrunk from $4.42 billion in 1981 to about $3.91 billion in 1982.[17]

Oman is in the second year of its second 5-year development plan. The $21.5 billion plan, drawn up in 1980, projected 5% annual oil price increases through 1985. The drop in spot market oil prices from $40 per barrel in 1980 to below $34 per barrel in 1982 resulted in several project postponements and a general scaling back of development expenditures. Even with total revenues declining, petroleum generated 90% of the total export revenues and 68% of the 1982 GDP, estimated at $5.9 billion. One of Oman's largest development projects, the Sohar copper project, came onstream providing both a new source of income and the beginning of a nonoil industrial base for the country.

Crude oil production in Oman increased slightly more than 2%, to an average of 335,884 barrels per day, although output ranged from a high of near 360,000 barrels per day to under 320,000 barrels per day during the year. Petroleum Development Oman (PDO), owned 60% by the Government, 34% by the Royal Dutch/Shell Group of the Netherlands, 4% by Compagnie Française des Petroles (CFP)-Total of France, and 2% by Participations and Explorations Corp. (Partex) of Portugal, was the dominant producer, responsible for 96% of the country's output. Société National Elf-Aquitaine (SNEA) of France, became Oman's second oil-producing company when it brought its Sahmah Field, located in the Butabul concession in western Oman, onstream in November 1980. Production from Sahmah averaged 11,389 barrels per day in 1982. PDO's concession covers roughly one-half of the country, running northeast-southwest, and encompasses every producing field except Sahmah. PDO's major fields in the northern region were Yiba, Fahud, Natih, Saih Nihayda, and Qarn-Alam, all of which produce between 30° and 40° gravity light crude. In southern Oman, in Dhofar Province, production from PDO's Marmul and Qaharie Fields was supplemented by output from the Rahab and Qatar Fields, both of which came onstream in 1981, and the Birba and Rima Fields, which were brought into production in 1982. The Rima Field, located 140 kilometers northeast of the Marmul Field, began producing 3,000 barrels per day in October and rose to 13,000 barrels per day by yearend. Rima crude, at 33° to 35° API gravity, is considerably lighter than the average 25° to 28° API oil traditionally produced in the southern Dhofar fields. Rima's output was expected to reach 45,000 barrels per day in 1983, bringing the Dhofar Province fields total contribution close to 50% of PDO's total output. The Jalmud Field, located 20 to 30 kilometers northeast of Rima, was also scheduled to come onstream in 1983, further raising PDO's production. Total recoverable crude oil reserves in Oman were increased again in 1982, to 2.9 billion barrels.

Crude oil production from the southern fields was transported into the northern network by a 455-kilometer, 18-inch pipeline running from Marmul to Qarn-Alam. This line then links the northern fields to the main pipeline running from Qarn-Alam to Shibkah to the export terminal at Mina-al-Fahal. Additional lines from Lekhwair, Yibal, and Fahal join the main line at Shibkah. The 400-kilometer segment to Mina-al-Fahal was being looped to handle the increased production, and new lines were under construction linking Fahal to the main terminal. A gas pipeline, linking natural gasfields and the gathering center at Yibal to the coast and then north to the copper mine at Sohar was completed.

Exploration activity has also picked up in Oman, a result of the recent successes of PDO and SNEA in their own prospecting efforts. Most of the country is being actively explored by several international companies and consortia. For PDO, exploration activity continued in southern Oman, while the Government evaluated the feasibility of using enhanced oil recovery techniques to raise an estimated 6 billion barrels of heavy oil discovered in central and southern Oman. At Qarn-Alam and Marmul, pilot projects using hot water injection were planned to raise some of the heavy oil from these two older fields that have been depleted of lighter crude. Although the projects were not scheduled to begin operating until the mid-1980's, secondary and tertiary recovery methods held the potential to extend Oman's recoverable crude oil reserves.

Oman's first oil refinery, the Oman Refinery Co.'s 50,000-barrel-per-day grass roots facility, was brought onstream in November 1982. The refinery was built by Mitsui Engineering and Shipbuilding Co. under a $112 million contract. Ashland Oil Co. of the United States was awarded the management contract for the refinery in June under the direct supervision of the Ministry of Petroleum and Minerals. Output from the refinery was expected to meet domestic demand and relieve the need to import all

of the country's petroleum products. The Oman Refinery Co. was owned 99% by the Ministry of Petroleum and 1% by the Central Bank. The GCC also recommended that a feasibility study be conducted on the possibility of constructing a joint venture export-oriented petroleum refinery and lube oil blending plant in Oman.

Natural gas was becoming an important source of energy in Oman. Production topped 500 million cubic feet per day, 75% of which was associated gas with the remainder being nonassociated gas. PDO was the primary supplier from its oilfields, while nonassociated gas was derived primarily from the Yibal Field. Of the country's total gas production, 187 million cubic feet per day was used for oilfield pressurization and gas lift, 32 million cubic feet per day was consumed directly as fuel for Government power generators and the desalinization plant, 30 million cubic feet per day was delivered to the Government gas system pipeline, and 42 million cubic feet per day was consumed in the production of NGL. The remaining production was flared. The Government's Yibal NGL plant was the only gas-processing plant in Oman. It produced about 2,000 barrels per day of natural gasoline, which was added to PDO's crude oil production to increase its API gravity; 15,000 barrels per day of propane, which is sold domestically; and 125,000 barrels per day of butane, which was sold to the Oman National Gas Co. for bottling and retail sales.

Startup of the Oman Mining Co.'s Sohar copper complex began at the close of 1982. The Oman Mining Co. L.L.C. (OMC) became a 100% Government-owned company in 1981 when the final 25% share of OMC was purchased from Marshall Oman Exploration Ltd. of the United States, the original joint venture partner. OMC is a fully integrated mine, mill, concentrator, smelter, and refinery operation. The copper deposits at Sohar, discovered in 1973, occur as massive pyrite and chalcopyrite in the Semail nappe of the Oman ophiolite sequence. Measured Sohar copper reserves, at the Lasail, Aarja, and Bayda ore bodies, were 8 million, 3 million, and 1 million tons, respectively, containing an average of 2.1% copper. Underground mining, utilizing sublevel caving techniques, began at Lasail and Bayda in 1982, and at full production will reach 2,500 tons per day from Lasail and 1,000 tons per day from Bayda. Production from Aarja will begin when reserves at Bayda are depleted.

Run-of-mine ore is fed to a jaw crusher and then to a concentrator utilizing autogenous grinding and seawater flotation. The concentrator can process 3,000 tons per day of ore and produce 250 tons per day of 24% copper concentrates. The concentrates are pelletized, dried, mixed with a flux and fed to a 7-megavolt ampere electric furnace, and then successively air and gas blown to produce a 99.7% grade blister copper. The copper is cast into anodes utilizing the Outokumpu continuous casting wheel.

The anodes are then transferred to the electrolytic refinery, where copper cathodes of 99.97% purity are produced. Annual cathode production was expected to reach 20,000 tons per year when full capacity is reached in 1984. Power for the plant is supplied by three 18-megawatt industrial gas turbines. Gas for the turbines is supplied by the Ministry of Petroleum via a 227-kilometer, 40-centimeter-diameter pipeline from the Government's gas network to the west. Output from OMC was intended for regional use, possibly by the Jeddah-based Saudi Cable.

Mineral resources in the Oman Mountains were not limited to copper. The Omani Government has also decided to begin producing chromite on a commercial scale. Small-scale extraction of chromite has been taking place near Ramji, and lump ore was being stockpiled at the Majis jetty, 17 kilometers north of Sohar from where copper and chromite will eventually be exported. Reserves were estimated at 5 to 10 million tons of podiform chromite in scattered deposits.

Table 4.—Oman: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, unwrought and semimanufactures	4	23	--	United Arab Emirates 16; Italy 7.
Copper: Metal including alloys:				
Unwrought	--	2	--	All to United Arab Emirates.
Semimanufactures	20	--		
Iron and steel: Metal, semimanufactures:				
Bars, rods, angles, shapes, sections	979	456	--	United Arab Emirates 446; Bahrain 10.
Universals, plates, sheets	67	196	--	Pakistan 100; United Arab Emirates 84; Lebanon 12.
Wire	19	34	--	All to United Arab Emirates.
Tubes, pipes, fittings	269	2,366	2,097	United Arab Emirates 261; United Kingdom 8.
Castings and forgings, rough	--	4	--	All to United Arab Emirates.
Other: Base metals including alloys, nonferrous scrap	5,251	5,588	--	Pakistan 4,835; United Arab Emirates 658.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	--	$2	--	All to United Kingdom.
Grinding and polishing wheels and stones	--	30	--	Mainly to United Arab Emirates.
Cement	3,290	167	--	United Arab Emirates 137; Qatar 30.
Clays and clay products: Products:				
Nonrefractory	18	730	--	United Arab Emirates 462; Saudi Arabia 268.
Refractory including nonclay brick	--	31	--	All to United Arab Emirates.
Fertilizer materials:				
Crude, n.e.s	27	--		
Manufactured, unspecified and mixed	1	2	--	All to United Arab Emirates.
Gypsum and plaster	354	--		
Lime	--	220	--	United Arab Emirates 194; Saudi Arabia 26.
Salt and brine	9	70	--	All to Iran.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	352	649	--	United Arab Emirates 594; Saudi Arabia 55.
Gravel and crushed rock	--	52	--	All to United Arab Emirates.
Limestone other than dimension	6,484	8,610	--	United Arab Emirates 7,876; Saudi Arabia 734.
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	3,316	7,611	--	United Arab Emirates 7,320; Saudi Arabia 291.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets and coke	--	9	--	Qatar 7; United Arab Emirates 2.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	1,914	58	--	All to United Arab Emirates.
Gasoline do	60	--		
Kerosine and jet fuel do	16	8	--	All to United Arab Emirates.
Distillate fuel oil do	15	336	--	United Arab Emirates 209; Bahrain 127.
Lubricants do	2,387	1,932	--	All to United Arab Emirates.
Bitumen and other residues do	12	48	--	Do.

Table 5.—Oman: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, unwrought and semimanufactures	1,415	1,559	8	Belgium-Luxembourg 580; United Arab Emirates 294; Thailand 177.
Copper: Metal including alloys:				
Unwrought	--	10	(1)	United Kingdom 7; India 2.
Semimanufactures	161	378	12	Belgium-Luxembourg 214; United Kingdom 64; Australia 43.
Iron and steel: Metal:				
Pig iron, ferroalloys, similar materials	--	675	--	United Arab Emirates 674; Japan 1.
Steel, primary forms	--	579	(1)	Japan 488; United Arab Emirates 51.
Semimanufactures:				
Bars, rods, angles, shapes, sections	58,013	95,669	46	Japan 63,034; United Arab Emirates 15,128; Argentina 5,081.
Universals, plates, sheets	10,717	10,986	--	Japan 7,722; United Arab Emirates 1,927.
Hoop and strip	--	263	--	Italy 148; India 94; Japan 20.
Rails and accessories	--	371	--	West Germany 333; Italy 36.
Wire	1,209	463	--	India 165; United Kingdom 145; Republic of Korea 96.
Tubes, pipes, fittings	30,306	83,112	759	Japan 52,885; West Germany 11,182; Netherlands 5,279.
Castings and forgings, rough	--	788	--	Republic of Korea 375; Japan 348.
Lead: Metal including alloys, unwrought and semimanufactures	21	240	78	India 118; United Kingdom 27.
Nickel: Metal including alloys, unwrought and semimanufactures	--	12	--	Japan 7; West Germany 4.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$15	$229	--	United Kingdom $218; United Arab Emirates $10.
Tin: Metal including alloys, unwrought and semimanufactures	--	5	--	NA.
Zinc: Metal including alloys, unwrought and semimanufactures value, thousands	--	$2	--	Mainly from United Kingdom.
Other:				
Oxides and hydroxides	--	7	--	India 3; Italy 1; Netherlands 1.
Base metals including alloys:				
Scrap	--	31	--	United Kingdom 21; United Arab Emirates 10.
Unwrought and semimanufactures	--	88	39	India 43; United Kingdom 6.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	101	40	United Arab Emirates 56; West Germany 3.
Grinding and polishing wheels and stones	2	200	--	India 186; Italy 5.
Cement	685,094	833,792	285	United Arab Emirates 318,578; Republic of Korea 179,370; Kenya 133,434.
Clays and clay products: Products:				
Nonrefractory	3,861	8,188	36	Italy 3,090; United Kingdom 1,255; United Arab Emirates 1,080.
Refractory including nonclay brick	--	2,567	(1)	United Arab Emirates 2,054; United Kingdom 210; Italy 195.
Diamond: Gem, not set or strung value, thousands	--	$36	--	United Kingdom $18; India $11; West Germany $4.
Fertilizer materials:				
Crude, n.e.s	1,112	596	--	United Arab Emirates 355; United Kingdom 97; Ireland 78.
Manufactured:				
Nitrogenous	--	7,190	--	Italy 2,610; United Arab Emirates 563; United Kingdom 406.
Phosphatic	--	249	100	India 52; West Germany 50; United Kingdom 29.
Potassic	--	896	--	Netherlands 478; West Germany 266.
Unspecified and mixed	6,197	3,323	(1)	Belgium-Luxembourg 2,000; West Germany 453; Switzerland 284.

See footnotes at end of table.

Table 5.—Oman: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Gypsum and plaster	250	105	--	United Arab Emirates 93; Cyprus 10.
Lime	1,448	3,507	--	Spain 2,547; United Arab Emirates 682; India 106.
Salt and brine	2,335	7,042	12	Netherlands 4,900; United Arab Emirates 1,447; China 460.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,402	893	--	Italy 607; Greece 110; Italy 100.
Worked	--	1,899	--	United Arab Emirates 1,070; Italy 734.
Gravel and crushed rock	821	26	--	India 14; United Arab Emirates 12.
Limestone other than dimension	1,430	668	--	United Arab Emirates 649; United Kingdom 19.
Sand other than metal-bearing	159	359	138	United Arab Emirates 163; India 44.
Other:				
Crude	--	15,618	365	United Arab Emirates 8,253; Cyprus 3,125; Singapore 2,500.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	6,067	5,394	143	United Arab Emirates 1,916; West Germany 1,104; United Kingdom 842.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets and coke	--	89	1	United Arab Emirates 68; Sri Lanka 10.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	53	108	(1)	Mainly from United Arab Emirates.
Gasoline do	1,338	1,794	1	Bahrain 1,293; United Arab Emirates 331; Singapore 78.
Mineral jelly and wax do	(1)	--		
Kerosine and jet fuel do	656	915	--	Bahrain 775; Kuwait 73.
Distillate fuel oil do	1,140	1,948	(1)	Bahrain 967; United Arab Emirates 330; Kuwait 249.
Lubricants do	151	143	6	United Kingdom 44; Singapore 41; United Arab Emirates 26.
Residual fuel oil do	4	60	(1)	Kuwait 50; United Kingdom 6.
Bitumen and other residues do	271	608	--	Bahrain 304; United Arab Emirates 153; Austria 51.
Tars and other crude chemicals derived from coal, gas, and petroleum	--	102	--	United Arab Emirates 94; United Kingdom 7; Japan 1.

NA Not available.
[1]Less than 1/2 unit.

QATAR

Qatar experienced a substantial 18% decrease in crude oil output, a temporary shortage of natural gas, and a considerable drop in petroleum derived revenues, from $5.29 billion in 1981 to an estimated $3.98 billion in 1982.[18] Qatar, however, looked hopefully toward the future development of its giant offshore North Field nonassociated gas deposit. Natural gas reserve estimates for the field range from a conservative 110 trillion cubic feet, to a possible 330 trillion cubic feet, making it among the six largest gasfields ever discovered. While the North Field assured Qatar of a continuing revenue source through the next century, the current revenue picture was not nearly as bright.

Petroleum revenues supplied 90% of the Government's total revenue and 93% of total exports. Even with oil revenues down, and an estimated 18% increase in imports, total exports in 1982 amounted to $4.28 billion, while imports reached approximately $1.8 billion, leaving a substantial merchandise trade surplus.[19]

Despite its assumed hydrocarbon-based future, Qatar continued to develop and strengthen its nonoil industrial sector,

which includes production of petrochemicals, chemical fertilizer, steel, cement, and NGL. The most serious problem Qatar faced in 1982 was the shortage of natural gas, which provided fuel and feedstock to the country's major industries.

Qatar's oil production has declined considerably over the last several years, a result of both the growing surplus in the oil market and the maturity and depletion of its oilfields. The Qatar General Petroleum Corp. (QGPC), owned by the Government, controlled the country's oil industries from exploration and production to refining, marketing, and petrochemical and fertilizer production. The refining, petrochemical, and fertilizer industries were managed by QGPC subsidiaries: National Oil Distribution Co., Qatar Petrochemical Co. (QAPCO), and the Qatar Fertilizer Co. (QAFCO), respectively.

Crude oil production averaged 329,559 barrels per day, of which 171,668 barrels per day was derived from the onshore Dukhan Field, and 157,892 barrels per day was from the three offshore fields, Bul Hanine, Maydan-Mahzam, and Idd al-Shargi. Bul Hanine provided the bulk of the offshore production, about 60%, with Maydan-Mahzam supplying 30% and Idd al-Shargi, the remainder. Qatar's maximum production capacity was estimated at 525,000 barrels per day. Onshore, about 170 wells were operating in three producing zones, Khatiyah, Fahahil, and Jaleha. Seventy wells produced oil, eleven produced gas, and the remainder were for water and pressure control. Recoverable oil reserves at Dukhan are estimated at 2.4 billion barrels, a slight increase over that of 1981 and a result of improved recovery from dump flooding. Reserves at the offshore fields were estimated at 2.3 billion barrels of oil although production here has been slipping more rapidly than at Dukhan, and productivity is expected to decline steadily over the next 10 to 15 years.[20]

Qatar's other potential producing field was the offshore Bunduq Field, straddling the territorial waters of Qatar and the United Arab Emirates. After commencing production in 1976 at 30,000 barrels per day, output slumped to 4,000 barrels per day in 1979, and production was halted in order to implement a secondary recovery procedure. In June 1982, the National Petroleum Construction Co. of Abu Dhabi was awarded a $68 million contract to construct offshore production facilities and water reinjection equipment. The field was scheduled to resume production in June 1983. Bunduq was operated by the Al Bunduq Co., owned equally by British Petroleum (BP), CFP, and United Petroleum Development Co., and its oil was exported via the Das Island terminal in Abu Dhabi.

Qatar's crude oil was exported under contract to the service companies that operate the oilfields under the supervision of QGPC. The Shell Service Co., a subsidiary of Shell International Petroleum Maatschappij, and the Dukhan Service Co., formerly the Qatar Petroleum Co. (QPC), a joint venture of BP, CFP, Royal Dutch/Shell, Mobil, Exxon Corp., and Partex, were the two companies that developed Qatar's oil industry. With the advent of Government ownership, these companies became service organizations to operate the fields and market the crude oil on behalf of QGPC. Shell's contract was for 145,000 barrels per day of offshore production, while the former QPC shareholders were to receive 130,000 barrels per day, although owing to Qatar's reduced output, these companies were not able to lift the full amount in 1982. The remaining crude oil output, except for that used in the refinery, was sold under contract to the Japanese companies, Mitsubishi Corp. (30,000 barrels per day), Sumitomo Petroleum Development Co. Ltd. (10,000 barrels per day), and Idemitsu (40,000 barrels per day). Mitsubishi and Sumitomo renewed their contracts at these levels in 1982, while Idemitsu's two contracts, each for 20,000 barrels per day, were scheduled to end on December 31, 1982, and in June 1983, respectively.

QGPC's existing 10,000-barrel-per-day petroleum refinery at Umm Said was scheduled to be integrated with its new 50,000-barrel-per-day facility, now under construction, by October 1983. Demand for refined petroleum products in Qatar has recently outstripped domestic production capacity, and the new refinery was expected to restore production self-sufficiency to Qatar, as well as provide a surplus for export. A refined products pipeline was also under construction from the new plant to Doha, the capital. The 48-kilometer, 25-centimeter line, under construction by Technip of France, who is also building the Umm Said refinery, was to be completed by mid-1983.

Although Qatar's oil industry and economy continued to be affected by the changing nature of the world oil markets, its future as a wealthy energy supplier was guaran-

teed by the tremendous reserves of natural gas under its offshore waters. Qatar moved forward in its plans to develop the field in 1982, pressed more by its need to maintain adequate gas supplies for its own industries than by its revenue requirements. Qatar currently produces both associated and nonassociated gas, all of which is consumed by domestic industries. Natural gas production averaged about 521 million cubic feet per day, one-half of which came from the nonassociated Khuff Field located onshore beneath the Dukhan Oilfield. Khuff gas was used to make up for the shortfall in supply of associated gas from the onshore and offshore oilfields. Gas demand from Qatar's two NGL plants (NGL I and NGL II), QAPCO, Qatar Steel Co. (QASCO), QAFCO, and power and water desalinization plants, was close to 800 million cubic feet per day. Reserves in the Khuff Field were estimated at 780 billion cubic feet, and were insufficient to fully supply the industrial needs of Qatar for any extended period.

The Qatari Government responded to this temporary gas crisis by pushing ahead plans to develop the North Field. QGPC selected BP and CFP to become minority partners in a $6 billion venture to develop, process, and export gas from the North Field. Each partner was to hold a 7.5% equity share, with maximum foreign shareholding amounting to 30%. BP and CFP may be able to increase their shares in the project, or the remaining 15% may go to Japanese marketing and transportation companies, who appeared destined to receive the bulk of the liquefied natural gas (LNG) output.

The overall plan to develop the field envisioned a total output of 2 billion cubic feet per day, of which 760 million cubic feet per day would be directed for local consumption, and the remaining amount would be earmarked for export in the form of LNG. The LNG plant, now scheduled to be located at Umm Said, was to produce 6 million tons per year of LNG, 50,000 to 700,000 barrels per day of condensate, 120,000 barrels per day of NGL, and 40,000 tons per year of sulfur. BP and CFP were to each hold a 7.5% stake in LNG production, with another 15% set aside for future participants. QGPC was to fully own the condensate and NGL portion of the project. BP's and CFP's first task, according to QGPC, was to find purchasers of LNG on a 20-year-contract basis, a process that was expected to take 2 to 7 years. Contracts would have to be finalized prior to commencing development work on the export project. The domestic development stage, however, was scheduled to begin in late 1983 or early in 1984. Wintershall AG (Federal Republic of Germany), which holds the only non-Government concession on the southern fifth of the North Field, proposed a scaled down project to develop its concession to only supply Qatar's domestic needs.

In other gas-related development, Royal Dutch/Shell agreed to pay $15 million for replacement of a 30-kilometer, 61-centimeter pipeline linking the offshore oilfields to NGL I and II and QAPCO at Umm Said. The existing pipeline had been blocked by unidentified black sediment since its commissioning in 1978, a problem that had further reduced gas supplies to Qatar. The sediment led to a dispute between Royal Dutch/Shell, which operates the offshore fields, and Ente Nazionale Idrocarburi of Italy, which laid the pipelines, over who was responsible for fixing or replacing line. A parallel crude oil line was also in need of similar repairs.

Qatar continued to be a Middle East leader in downstream petroleum and gas processing, despite the detrimental effect of the gas shortage. Production of ethylene and other basic petrochemicals from the QAPCO facility at Umm Said was below capacity in 1982 because of the gas shortage and the blockage in the gas pipeline. QAPCO, a joint venture of QGPC (84%) and Charbonnages de France-Chemie (16%), was designed to produce 280,000 tons per year of ethylene, 140,000 tons per year of low-density polyethylene, and 46,000 tons per year of sulfur, utilizing ethane-rich gas from the NGL plants. QGPC decided to suspend construction of a 70,000-ton-per-year, high-density polyethylene unit at the plant, and canceled a letter of intent for construction of the $80 million project that had been awarded to Mitsui Engineering in June 1982. The $770 million QAPCO plant came onstream in February 1981 and output has yet to reach design capacity.

QAFCO, also a gas dependent industry, operated at about 85% of total capacity in 1982. QAFCO consists of two parallel ammonia-urea trains, QAFCO 1 and 2, that came onstream in 1976 and 1979, respectively. QAFCO 2 reportedly operated at 99% of rated capacity throughout 1982, while output from the No. 1 unit was substantially lower. QAFCO, a joint venture of the Government of Qatar (70%), Norsk Hydro AS of

Norway (25%), and Hambros Bank (2%) and Davy Powergas Ltd. (1%), both of the United Kingdom, was planning to build a gas sweetening plant to desulfurize associated gas from the offshore oilfields. This unit was designed to ensure a total output of 110 to 115 million cubic feet per day of gas feedstock derived mostly from onshore associated gas and some Khuff gas, with a small portion coming from offshore. The new gas plant should enable the QAFCO facility to operate at rated capacity when it is completed.

Qatar's other major gas-consuming industry was QASCO's 900,000-ton-per-year Midrex direct-reduction-based steel mill. The direct-reduction mill feeds two 70-ton electric arc furnaces supplied by Nippon Kokan K.K. of Japan, which in turn supply two 4-strand continuous billet casters, and a 20-strand bar mill. Shares in QASCO were held 70% by the Qatar Industrial Development Agency, 20% by Kobe Steel of Japan, which supplied the billet casters and bar mill, and 10% by Tokyo Boeki, also of Japan. Production from the plant substantially exceeded its design capacity of 440,000 tons of semimanufactured steel for the third year in a row by producing an estimated 452,000 metric tons of steel. About 10% to 15% of QASCO's output was consumed domestically, with the remainder being exported locally, mainly to Saudi Arabia and the United Arab Emirates.

Finally, Qatar's cement industry was preparing for a large-scale expansion in 1982. The National Cement Co., which operated the country's only cement plant, a 900-ton-per-day facility at Umm Bab, awarded a $128 million contract to Hyundai Heavy Industries Co. Ltd. of Korea for construction of a new plant, 18 kilometers from Umm Bab, that would produce 7,000 tons of cement per day bringing Qatar's total annual capacity to over 1 million tons. Demand was estimated at nearly that level.

SYRIA

Syria's diverse resources, including oil, gas, phosphates, and agricultural products, along with relatively high rates of investment, have enabled it to maintain a positive economic growth rate over the past several years. Syria's GDP, estimated at $18 billion[21] in 1982, has increased 9% annually in real terms from 1978 to 1980, another 8% from 1980 to 1981, before slowing to about 5% in 1982. Among the problems for Syria's economy, however, were the recent decline in the price of oil, its large balance-of-trade deficit, estimated at $2 billion in 1982, and a continuing high rate of inflation, about 15%.

Syria's budget was cut to $8.4 billion, slightly lower in real terms than that of 1981. Among the cuts made were investment allocations to the various ministries including the mineral and petroleum sector.

Despite the cutbacks in project financing, recent accomplishments in Syria's mineral sector include the first full year of operation of the country's two new fertilizer complexes, both located at Homs, the 1981 commissioning of Syria's second petroleum refinery, the completion of the first and second production lines of the huge Tartous cement plant, and the fifth consecutive year of production increases from the phosphate mining industry. On the negative side, production of petroleum declined in 1982 for the third consecutive year as reserves were depleted and recovery of Syria's heavy crude became more difficult. Syria closed the IPC pipeline, halting Iraqi exports via the Mediterranean and terminating Syria's refinery supply agreement, while it negotiated a new supply agreement with Iran.

Syria derived roughly 50% of its total export revenues of $2.1 billion and 6% of its GDP from oil production. Production in 1982 averaged 152,400 barrels per day, down 7% from that of 1981. Proven oil reserves at yearend 1982 were placed at 1.89 billion barrels, but most of the oil was heavy 20° API gravity or lower, with a sulfur content ranging from 4.5% to 9.5%. Syria's major oilfields were Suweidiyah, Rumeilan, Karatchok, Al-Hayane, Jebisseh, and Hamza, all of which were discovered between 1950 and 1974. In 1982, the Syrian Petroleum Co., owned by the Government, was the only oil producer in Syria.

With oil reserves in Syria expected to last only about 25 years and consumption, estimated at 39 million barrels in 1982 and expected to rise 7% per year, the Syrian Government was actively encouraging exploration efforts, mainly by foreign firms. Since 1974, Syria has been following an open door policy for foreign exploration. Among the companies still active in Syria were the Syrian-American Oil Co. (SAMOCO), a subsidiary of Coastal States Corp. of Houston, Tex.; Pecten Syria Co., owned 50%

by Shell International and 50% by Shell Oil Co., Marathon Oil Co. of the United States, and Challenger Desert Oil Co. of Panama. The most active companies in exploration were SAMOCO, which has been drilling in the Deir el-Zor area for the last 2 years; Marathon, whose drilling has centered around Homs and Palmyra; and Pecten Syria, which has reportedly discovered gas in an undisclosed area.

There were two oil refineries operating in Syria in 1982: The 120,000-barrel-per-day Baniyas refinery that was brought into commercial production in 1981 and the older 100,000-barrel-per-day refinery at Homs. The Baniyas refinery was able to operate at only 75% of capacity in 1982 owing to the irregularity of oil supplies, first from Iraq and then from Iran. Previously, Syria had purchased about 100,000 barrels per day from Iraq delivered via the Kirkuk to Baniyas to Tripoli pipeline for mixing with heavier Syrian crude oil to process in the country's two refineries. Syria consumed approximately 110,000 barrels per day of refined petroleum products in 1982, and the remainder of the country's output was exported. In April, Syria stopped the flow of oil through the IPC pipeline, effectively eliminating about 40% of Iraq's exports of crude oil. A month earlier, Syria had concluded an agreement whereby Iran would supply Syria with 180,000 barrels per day of crude oil, basically the precise amount needed for Syria's refineries. Iraq and Syria have both estimated Syria's annual loss of transit fees from Iraqi pipeline exports at $100 million and $20 million, respectively, with a more realistic figure being about $50 million. The effect on Iraq was more serious, however, because the Kirkuk-Baniyas-Tripoli pipeline and the Kirkuk to Ceyhan, Turkey, pipeline were Iraq's only means of exporting oil while its export facilities on the Arabian Gulf remain inoperable. Syria's supply agreement with Iran was to cover a period of 10 years.

In the nonfuel mineral sector, phosphate rock and fertilizer materials were Syria's most significant products. Phosphate rock was produced from two areas in Syria; Al-Shargiya and Khunayfis, both located about 50 kilometers south of Palmyra and 160 kilometers southwest of Homs. Both deposits were operated by the state-owned General Co. for Phosphates and Mines. Annual production capacity was about 500,000 tons containing 24% to 29% P_2O_5 or 52% to 63% bone phosphate of lime (BPL), which is concentrated by dry selected crushing and screening to a product of 69% to 73.5% BPL. The Shargiya A and B deposits supply over 1 million tons per year of 58% to 62% BPL ore, with the capacity of Eastern A at 600,000 tons per year of phosphate concentrate, and Eastern B at 400,000 tons per year of concentrate. Total reserve at both deposits were estimated at 65 million tons of recoverable ore containing 59% to 61% BPL.

Although Syria's production of phosphate rock increased in 1982, exports of phosphate were down 2.2% to about 700,000 tons. Phosphate was exported to Romania (60%), China (15%), Czechoslovakia (13%), Bulgaria (11%), and Italy (1%).

Exports also declined because some of the mine output was delivered to the new $180 million triple superphosphate fertilizer complex at Homs. The plant, commissioned in March 1981, was designed to produce 150,000 tons of phosphoric acid and 450,000 tons of triple superphosphate annually from a phosphate input of 800,000 tons per year of concentrated ore. The plant was undergoing test runs throughout 1982, and commercial production was scheduled to begin early in 1983.

Syria's General Establishment of Chemical Industries operated two ammonia-urea fertilizer plants located in Homs. The older plant, commissioned in the late 1960's, was capable of producing 110,000 tons per year of nitrogenous fertilizer, while the new plant, commissioned in July 1981, could produce 1,000 tons per day of ammonia and 1,000 tons per day of urea. Both plants utilize naphtha feedstock from Syria's two refineries. Production of nitrogenous fertilizer exceeded domestic consumption in 1982, and the surplus was shipped by rail to the Port of Tartous for export.

Syria's cement production capacity has increased rapidly over the past several years, from about 2 million tons in 1980 to over 4 million tons in 1982. Production increased 32% from the 1981 level, and further increases were expected in the coming years. The reason for the increase was the completion of two new plants in 1981, the Al-Muslimiyah and Skiekh Said plants, both located in Aleppo; and the startup of three additional plants in 1982 at Hamah, Adra, and Tartous. The Tartous plant, when fully operational, was to be the Middle East's largest cement plant, with a total annual capacity of 2.34 million tons. The first two 1,600-ton-per-day finished cement

lines were brought onstream in 1982, with the next two expected to follow in 1983. Cement consumption in Syria was approximately 3 to 3.5 million tons per year, which meant Syria still imported roughly one-third of its domestic requirement. By the end of 1983, Syria was expected to switch from a net importer to a net exporter of cement.

Steel production from Syria's General Co. for Iron and Steel Products (Gecosteel) 120,000-ton-per-year electric steelmaking plant remained at around the 100,000-ton-per-year mark in 1982. The plant, commissioned in 1977, produced steel billets, merchant bars, and galvanized and welded pipe, all from imported direct-reduced iron and scrap. Capacity of the wire rod mill, located in Hama, was to be raised to 200,000 tons per year by 1985. Several companies from the Federal Republic of Germany and the German Democratic Republic were being considered by Gecosteel to perform the expansion project.

Other developments in the nonmetallic minerals sector included the opening of two marble dressing plants, at Al-Zobar near Latakkia and at Damascus, and a planned 15-ton-per-day sulfur recovery plant to be operated by the Syrian Petroleum Co. at Roumelan.

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

The economy of the People's Democratic Republic of Yemen (PDRY) continued to grow at a slow, measured pace in 1982. The high point of the year was the announcement by Azienda Generale Italiani Petroli S.p.A. (AGIP) of Italy that it had discovered oil in the offshore waters of PDRY, after years of unsuccessful exploration by a host of international companies.

Since achieving independence from Great Britain in 1967, PDRY's economy has remained fairly stagnant, a result of the paucity of domestic resources, and more importantly, the declining economic contribution of its oil bunkering and refining facility at Aden. This port, prior to the closure of the Suez Canal in 1967, was the sixth largest oil bunkering port in the world and the main port on the Arabian Peninsula. Despite the reopening of the canal, oil bunkering and refining remain at about 20% of their pre-1967 levels.

The influence of petroleum on the domestic economy was beginning to increase in 1982, however, as a result of new supply agreements for the Aden refinery and the new potential for domestic production. Yemen's total exports were estimated at about $900 million, 95% of which were refined oil products, for which all the crude input had to be imported, at a cost of between $700 and $800 million.[22] Total imports exceeded $1 billion, leaving the country with a current account deficit in excess of $225 million. As part of the Government's revised second 5-year development plan (1981-85), about $1.5 billion was to be allocated for investment over the plan period, or roughly 31% of the gross national product.

The oil discovered in April at AGIP's 1-X Sharmah wildcat well in 135 meters of water 5 miles offshore in the Gulf of Aden flowed at 3,000 barrels per day of 43° API gravity crude through a 1/2-inch choke, from a pay zone at 2,200 meters depth. The discovery was located on AGIP's Mukalla offshore concession, on which six wells had already been drilled. Throughout 1982, AGIP was in the process of evaluating the recoverable reserves in the field and determining its commercial potential. AGIP, through two separate concession agreements, held approximately 15,000 square kilometers of oil and gas exploration acreage, on the area offshore around the Mukalla coast, and the other onshore in the Qamar region. In addition to AGIP, a 42,000-square-kilometer concession onshore in the Hawarim-Gheida region, was held by Braspetro, a subsidiary of the Brazilian state oil company Petróbras Brasileira S.A. (80%) and by Spain's Hispanol (20%). Technoexport of the U.S.S.R., under contract to PDRY's Petroleum and Minerals Board (PMB) was conducting seismic surveys and drilling exploratory wells in Hadhramaut and Shabwah Provinces. The World Bank was also financing seismic surveys to attract companies interested in taking new concessions in PDRY. Finally, the Independent Petroleum Group (IPG) of Kuwait began exploration on a 13,000-square-kilometer concession, one-half onshore and one-half offshore in the Balhaf region of Shabwah Province. The concession was located about 150 kilometers west of AGIP's 1-X Sharmah discovery. Terms of the concession agreement involved initial seismic work, followed by exploratory drilling and

production sharing with PMB. The agreement covers 3 years.

Kuwait's IPG was also taking an active role in reviving the Aden refinery and oil bunkering facility. IPG concluded an agreement in March 1982 with PMB that allows IPG to process and blend products in the Aden refinery for marketing to the Middle East and Africa. IPG was also to construct product storage tanks, arrange shipping services, and prepare a feasibility study on modernizing the refinery. The 150,000-barrel-per-day refinery operated at about 50% of its design capacity, mainly by processing crude on behalf of third parties. Domestic consumption in PDRY averaged 10,000 barrels per day, which was imported and refined at Aden by PMB. Third party customers using the refinery included Iran's National Iranian Oil Co. (50,000 barrels per day), the Kuwait National Petroleum Corp. (10,000 barrels per day), the U.S.S.R. (10,000 barrels per day), and France's CFP-Total (5,000 barrels per day). Despite the relatively small volumes of products, these reexports constituted a major revenue source for PDRY.

PDRY's nonfuel mineral sector consisted of the production of unrefined marine salt from the General Salt Organization's evaporation pans of Khawr Maksior. Output from the plant averaged 50,000 to 75,000 tons per year.

YEMEN ARAB REPUBLIC

Economic and mineral development in the Yemen Arab Republic (YAR) remained sluggish in 1982. The YAR was considered 1 of the world's 10 least developed nations, while boasting the highest population density on the Arabian Peninsula. The Yemeni economy was still primarily based on agriculture, although attempts to make the country self-sufficient in food production have failed, mostly as a result of the availability of cheaper imports and the effect of domestic inflation.

The Government's efforts to promote industrial development in YAR have not met with particular success to date owing to the Government's lack of investment capital. The one Government agency, based in the capital of Sanaa, that has been the most active was the Yemen Oil and Minerals Co. (Yominco), which has entered into several oil exploration agreements with foreign firms and has recently cooperated in the discovery of a potential copper-nickel-iron cobalt deposit near Taiz. This deposit may provide a basis for a new mineral industry to add to the current production of rock salt, cement, and gypsum.

YAR's GDP in 1982, in constant 1975 prices, was estimated at $1.54 billion,[23] a 5% real growth rate from the 1981 level. Approximately 40% of YAR's labor force was employed in other countries, and those emigrant workers were responsible for YAR's largest inflow of revenue, foreign remittances, which totaled $1.17 billion in 1982. The major economic problem in Yemen was its balance-of-payments situation. Because of its high population and low domestic productivity, legal documented imports totaled $1.95 billion while exports only reached $4.7 million. Even with worker remittances and a substantial level of foreign aid, Yemen's overall balance-of-payments recorded a $347 million deficit. Combine this economic strain with a devastating earthquake that struck the Dhamar Province in 1982 causing close to $1 billion worth of damage, YAR's economic problems will continue for several years to come.

The most important development in the mineral fuel sector in 1982 was the continuing exploration effort of Yominco, mainly in association with the Yemen Hunt Oil Co., a subsidiary of Hunt Oil Co. of the United States. Yemen Hunt completed its seismic exploration in the Wadi Jawf region and was evaluating its results before committing itself to a drilling program. Yominco was also seeking foreign partners to follow up on Shell Oil (United States) seismic exploration of the Tihama coastal plain. YAR imported 6,526,000 barrels of refined products mainly from Kuwait in 1982, along with 25,570 tons of liquefied petroleum gas, all for domestic consumption.

In other fuel-related areas, an unnamed Japanese company signed an agreement with Yominco to build a gas bottling plant with a capacity of 24,000 cylinders per day in Al-Hudaydah.[24] Gas supply for the plant was to be imported, but the plant was expected to significantly reduce the cost of gas for home fuel and heating. The project was to be completed in mid-1984.

Yominco also awarded a contract to Omnium Technique des Transports of France for construction of a petroleum products pipeline from Salif to Mabar and then north

to Sanaa. The two parallel, 272-kilometer, 25-centimeter lines were planned to distribute refined products around the country. This $150 million project was in the design stage in 1982. The World Bank was also active in financing oil exploration in YAR, as well as in encouraging foreign oil companies to take up the search based on exploration data already available.

In the nonfuel minerals sector, Yominco announced the discovery of a potentially exploitable deposit containing copper, nickel, iron, and cobalt in an estimated 10 to 15 million tons of metal-bearing ore. The deposit, located near Al-Hamoura in the Haifan region 290 kilometers south of Sanaa was being further investigated to determine the best means of extraction.[25] The Bureau de Récherches Géologiques et Minières of France won a contract late in the year to continue its feasibility study on the possible exploitation of mineral resources in the Nihm region, located northeast of Sanaa. A team of geologists from the U.S.S.R. was also discussing the possibility of technical cooperation with YAR's Ministry of Energy and Mineral Resources, as part of an existing agreement.[26]

The increase in cement production was one of YAR's bright spots in the mineral industry in 1982. The U.S.S.R. expanded a cement plant in 1981 that it originally built in 1961, raising capacity from 80,000 to 300,000 tons per year. Increased production from the plant, located at Banjil, north of Hodeida, was responsible for YAR's almost 200% increase in production. A second 500,000-ton-per-year cement plant was under construction at Amran, 50 kilometers north of Sanaa, in 1982 by Ishikawajima-Harima Heavy Industries Co. Ltd. and Nissho-Iwai Corp., both of Japan, at a cost of $110 million. Status of the plant was unavailable at yearend.

YAR's only other mineral product was rock salt from the Yemen Salt Mining Co.'s open pit rock salt deposit adjacent to the Port of Salif. Gypsum for the cement industry was recovered in association with rock salt from Salif.

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The Mineral Industry of Other Areas of South America

By Travis Q. Lyday[1]

CONTENTS

ECUADOR

Ecuador's economy continued to slow in 1982 due, in part, to declining foreign demand for oil, depressed world oil prices, and high international interest rates. Real growth of the gross domestic product (GDP) was estimated to be in the 2% to 3% range, down from the revised 4.3% recorded in 1981 and the 4.5% anticipated officially. In current prices, the GDP in 1982 was estimated at $12.1 billion.[2] Inflation abated slightly from that of 1981 to an estimated 13.9% annual rate. The sucre was devalued in May by 32%, the first time in more than a decade, as a result of the pervasive flow of capital abroad.

Ecuador's production of petroleum increased an estimated 1.9% in 1982 compared with that of 1981. The consortium of Corporación Estatal Petrolera Ecuatoriana (CEPE), the state oil company holding a 62.5% interest, and Texaco Inc. (37.5%) produced an estimated 98%, or approximately 211,000 barrels per day, of the total from the northern part of El Oriente, the eastern jungle region, where a Texaco-Gulf Oil Corp. partnership discovered oil in 1967. Gulf subsequently sold out to CEPE in 1977 for $117 million. Remaining production was from the Santa Elena Peninsula Fields on the Pacific coast where production has been steadily declining for several years.

The volume of crude petroleum exports decreased an estimated 10% from the revised 44.6 million barrels in 1981 to 40 million barrels in 1982. Crude petroleum export revenues were estimated to have decreased over $400 million in 1982 to about $1.1 billion.

In August, the Ecuadorean President signed into law two hydrocarbons reform bills amending the Hydrocarbons Law of 1971 (as amended) and establishing the new Income Tax Law relating to hydrocarbons contracts. However, the Ministry of Natural Resources and Energy must prepare implementing regulations and other documents outlining procedures before the Government can announce an international call for tenders. An early implementation was not expected at yearend.

The principal reform introduced by the amendments to the hydrocarbons law is the establishment of "risk-sharing" contracts for the exploration and exploitation of petroleum and natural gas. Under this provision, contractors exploring for hydrocar-

bons would be reimbursed for their expenses, and entitled to receive a service fee, by CEPE only if hydrocarbons were discovered and produced in quantities commercially feasible to exploit.

Other major provisions in the reform legislation provide reimbursement to CEPE by contractors or other components of the Government for its production, transportation, and selling costs; a permanent fund for hydrocarbons exploration blocks; the restriction that a contractor, once granted exploration rights for a block in the Oriente, can bid for rights to a second block only in the Pacific coast region or offshore; minimum annual investments per hectare that a contractor must make; that contractors make a major effort to train Ecuadorean personnel; the affirmation that contractors will not be assessed royalties, signature bonuses, or surface charges, or be required to undertake complementary works; and the earmarking of 12.5% of production from hydrocarbons deposits to the Eucadorean military.

The Hydrocarbons Income Tax Law provides that contractors receiving service fees will be subject to two types of taxes, Ecuador's regular corporate income tax and a production tax based on average production levels. However, the production tax would not be applicable to the production of heavy crude (below 15° API) or less than 30,000 barrels per day of light crude. The law also reaffirms that companies that are paid service fees will be required to distribute 15% of their profits to their workers.

The lengthy delays in starting the project to expand the principal refinery, owned by CEPE and located at Esmeraldas, Esmeraldas Province, through revamping will apparently delay its completion until at least mid-1984. CEPE's plans for the construction of a new 75,000-barrel-per-day refinery in Atahualpa, Guayas Province, have apparently been deferred indefinitely.

CEPE announced in June that its Gulf of Guayaquil contractor, the Panamanian drilling company Permargo Internacional S.A., a unit of Perforaciones Marinas del Golfo S.A. de Mexico, which signed a contract in October 1981 for hydrocarbons exploration in the gulf, discovered oil in its first test well Golfo-Uno at a depth of 3,871 meters. Although the well yielded minimal flow and subsequently proved noncommercial, the discovery was significant in that only natural gas deposits had been known in the gulf previously. At yearend, CEPE was negotiating with Permargo for a reduction of its $60,000-per-day leasing agreement of Parmargo's jack-up drilling rig Uxmal.

During the year, CEPE also began exploration drilling in the southeastern Amazon region of Conambo, Pastaza Province, near the Peruvian border, where seismic surveys have indicated similar geologic structures to those in the producing Peruvian fields. Texaco's first wildcat well, the Rumiyaku, was spudded in Texaco's concession in this area in August.

Texaco's $54-million, secondary-recovery-by-water-flooding project was also launched during the year at the Shushufindi Field, the country's largest, enabling an estimated additional 300 million barrels of crude oil to be recovered.

Toward the end of 1982, CEPE brought four of its wholly owned fields in the Oriente into production, adding 25,000 barrels per day to current production. Three additional fields in the Oriente, adding an additional 15,000 barrels per day to production, were scheduled to start producing in early 1983.

Reportedly, the CEPE-Texaco consortium budgeted $400 million for its petroleum exploration activities in 1982, compared with the $133.3 million and $42.3 million spent in 1981 and 1980, respectively. This helps to underscore the fact that Ecuador could become a net importer of petroleum by 1985, or 1987 at the latest, unless successful exploration is undertaken quickly. Proven reserve figures range from CEPE's 500 million barrels to Texaco's 2 billion barrels of oil.

In October, as part of a larger package of economic stabilization, the Government doubled the price of all grades of gasoline. The price of premium (92 octane) rose to the equivalent of $1.21 per gallon, almost seven times the 1980 price. The Government hoped the increases would stem growing domestic consumption, which increased an estimated 12% in 1982.

In sharp contrast to the development of the petroleum sector over the past decade, development of the Ecuadorean minerals sector has remained negligible despite continued geological reconnaissance and mineral exploration programs. Ecuador's most important mine was the La Plata copper-lead-zinc-gold underground operation near Santo Domingo de los Colorados, Cotopaxi Province, operated by Minera Toachi S.A. The mine is 70.94% owned by foreign companies including Outokumpu Oy of Finland (39%), Lakehurst Investment of the Baha-

mas, Cía. de Minas Buenaventura S.A. of Peru, and ANCOMIN Ltd. of Bermuda, plus private sector Ecuadoreans (29.06%). Earlier plans called for more than doubling ore production in a $5.2-million, 2-year investment program that was announced in 1980. Apparently, however, the project was delayed indefinitely. Metallgesellschaft AG of the Federal Republic of Germany and the International Bank for Reconstruction and Development, a component of the World Bank, were each to provide financing of $1 million for the expansion from the present 24,000 tons per year to 60,000 tons per year.

Reportedly, as a result of work carried out in Ecuador since 1972 under a technical assistance project, the Institute of Geological Sciences discovered a bed of sedimentary phosphate rock, 1 to 1.5 meters thick, in the Upper Cretaceous Napo Formation in the Oriente. Copper and copper-molybdenum mineralization was also reported.

Also, the Dirección General de Geología y Minas announced in midyear the discovery of an anthracite coal deposit, containing up to 100 million tons, near the town of Tena in Napo Province.

A $1.6-million, 3-year uranium exploration project, sponsored by the United Nations and the International Atomic Energy Commission, was approved early in the year by the Government through the Comision Ecuatoriana de Energia Atomica, the Ecuadorean Atomic Energy Commission.

The expansion of Empresa Cemento Chimborazo C.A.'s cement plant in Riobamaba, Chimborazo Province, was approved early in the year by the company's board of directors. Lafarge Consultants Ltd. of Canada was awarded the project definition and design study. The expansion will consist of a 500,000-ton-per-year precalciner line complete with new raw grinding, finish grinding, and quarry departments. The company was in the process of adding a precalciner to an existing kiln and doubling its stone-crushing facility during the year.

Plans to double the capacity of Cemento Selvalegre's 345,000-ton-per-year plant near Otavalo were still under consideration at yearend. A feasibility study was performed and submitted to the company during the year but apparently a decision was not announced.

Table 1.—Other Areas of South America: Production of mineral commodities[1]

Area and commodity	1978	1979	1980	1981[p]	1982[e]
ECUADOR[2]					
Cadmium, mine output, metal content, kilograms	417	[e]480	[e]480	400	300
Cement, hydraulic, thousand metric tons	834	1,099	1,389	1,450	1,400
Clays: Kaolin, metric tons	3,564	[e]4,000	4,000	4,000	[3]4,104
Copper, mine output, metal content, do.	800	1,200	1,200	1,200	[3]24
Gas, natural:					
Gross, million cubic feet	12,429	13,387	15,000	[e]16,000	15,000
Marketable, do.	[e]1,500	[e]1,600	1,600	[e]1,700	1,500
Gold, mine output, metal content, troy ounces	2,734	3,215	3,537	[e]3,700	[3]258
Gypsum (for cement), metric tons	34,209	6,000	6,000	2,000	2,000
Lead concentrates, metal content, do.	220	[e]220	220	200	235
Natural gas liquids:					
Natural gasoline, thousand 42-gallon barrels	79	NA	NA	NA	[3]45
Liquefied petroleum gas, do.	721	815	800	820	[3]117
Total, do.	800	NA	NA	NA	162
Petroleum and refinery products:					
Crude, do.	77,710	78,169	74,714	76,797	[3]77,106
Refinery products:					
Gasoline, do.	7,293	8,119	9,000	[3]7,802	[3]8,232
Jet fuel, do.	985	1,107	1,200	1,118	[3]1,065
Kerosine, do.	2,716	2,498	2,500	2,205	[3]2,531
Distillate fuel oil, do.	4,518	5,095	5,600	5,046	[3]5,221
Residual fuel oil, do.	13,018	13,775	14,500	14,614	[3]14,491
Lubricants, do.	234	267	300	300	[3]320
Other:					
Liquefied petroleum gas, do.	200	225	250	733	[3]646
Unspecified, do.	317	367	400	417	[3]460
Refinery fuel and losses, do.	1,016	554	1,000	346	[3]1,043
Total, do.	30,297	32,007	34,750	32,581	[3]34,009

See footnotes at end of table.

Table 1.—Other Areas of South America: Production of mineral commodities[1] —Continued

Area and commodity	1978	1979	1980	1981[p]	1982[e]
ECUADOR[2] —Continued					
Silica—metric tons	17,011	[e]13,130	13,200	13,200	[3]12,919
Silver, mine output, metal content—troy ounces	[r]28,936	35,366	28,936	32,151	10,000
Steel, crude, excluding casting—metric tons	--	8,100	16,100	26,200	[3]28,000
Stone, sand and gravel:					
Limestone (for cement manufacture) thousand metric tons	1,410	[e]1,300	1,300	1,250	1,200
Marble—metric tons	2,789	[e]2,700	2,800	2,800	[3]23
Sulfur:					
Native[e]—do	4,500	4,500	4,500	4,400	4,500
Byproduct:					
From petroleum[e]—do	5,000	5,000	5,000	5,000	5,000
From natural gas[e]—do	5,000	5,000	5,000	5,000	5,000
Total—do	14,500	14,500	14,500	14,400	14,500
Zinc, mine output, metal content—do	[r]1,342	[r]1,027	629	742	100
FRENCH GUIANA					
Gold, mine output, metal content—troy ounces	[e]5,000	5,000	4,000	4,000	4,000
Stone, sand and gravel—metric tons	325,000	[e3]37,000	507,800	[e]320,000	400,000
GUYANA[2]					
Aluminum:					
Bauxite, dry equivalent, gross weight[e] thousand metric tons	2,425	2,312	1,844	1,681	[3]953
Alumina—do	250	200	220	170	[3]73
Diamond:[4]					
Gem[e]—thousand carats	7	6	4	4	4
Industrial[e]—do	10	10	6	6	7
Total—do	17	16	10	[3]10	[3]11
Gold, mine output, metal content—troy ounces	15,404	10,593	11,003	19,262	[3]8,642
PARAGUAY					
Cement, hydraulic—thousand metric tons	166	155	177	161	110
Clays:					
Kaolin—metric tons	35,380	40,000	50,000	70,000	55,000
Other—thousand metric tons	1,518	1,870	2,200	2,400	21,000
Gypsum—metric tons	[e]9,000	[e]11,000	12,000	10,000	6,500
Lime—do	38,554	33,000	55,000	57,000	61,000
Petroleum refinery products:					
Gasoline—thousand 42-gallon barrels	805	662	906	799	[3]698
Jet fuel—do	75	94	101	132	[3]69
Kerosine—do	151	132	120	176	[3]88
Distillate fuel oil—do	1,710	1,705	1,931	1,931	[3]698
Residual fuel oil—do	371	384	371	384	[3]277
Liquefied petroleum gas—do	46	58	52	37	[3]35
Refinery fuel and losses—do	467	731	800	[e]735	305
Total—do	3,625	3,766	4,281	4,194	2,170
Pigments, mineral: Natural, Ocher metric tons	150	200	200	200	120
Sand including glass sand thousand metric tons	1,900	2,300	2,600	2,650	2,300
Stone:					
Dimension—do	197	224	258	248	110
Crushed and broken:					
Limestone (for cement and lime)—do	370	300	350	355	270
Other—do	5,140	5,450	6,400	[r e]3,600	2,500
Talc, soapstone, pyrophyllite—metric tons	160	210	250	150	150
SURINAME					
Aluminum:					
Bauxite, gross weight thousand metric tons	5,188	5,010	4,646	4,100	[3]3,059
Alumina—do	1,310	1,325	1,316	[e]1,200	[3]1,172
Metal, primary[5]—do	55	64	46	32	[3]60
Cement, hydraulic—do	60	62	69	71	[3]72
Clays:					
Common[e]—metric tons	115,000	115,000	115,000	110,000	100,000
Kaolin[e 5]—do	2,500	2,500	2,500	2,500	2,500
Gold, mine output, metal content—troy ounces	289	300	350	823	[3]599
Sand and gravel:					
Sand, common—thousand metric tons	160	150	155	[e]150	150
Gravel—metric tons	75,000	67,500	75,000	[e]70,000	70,000

See footnotes at end of table.

Table 1.—Other Areas of South America: Production of mineral commodities[1] —Continued

Area and commodity	1978	1979	1980	1981[p]	1982[e]
SURINAME —Continued					
Stone, crushed and broken thousand metric tons	40	50	72	52	[3]50
URUGUAY					
Aluminum, secondary metric tons	45	69	35	30	25
Barite do	33	25	35	30	30
Cement, hydraulic thousand metric tons	674	687	685	690	[3]551
Clays, unspecified metric tons	338,890	340,000	321,406	[e]300,000	300,000
Coke, gashouse[e] do	11,685	11,685	12,000	12,000	12,000
Corundum[e] do	223	227	187	220	225
Feldspar do	2,572	[e]2,700	2,820	[e]2,500	3,000
Fluorspar do	113	[e]77	[r]81	80	80
Gas, manufactured[e] million cubic feet	750	750	760	750	750
Gem stones, semiprecious:					
Agate metric tons	184	[e]200	285	180	200
Amethyst do	32	[e]33	62	30	50
Iron and steel:					
Ferroalloys: Electric-furnace ferrosilicon do	([6])	([6])	--	--	--
Steel, crude do	[r]6,858	[r]16,127	16,700	13,300	[3]20,000
Semimanufactures do	43,898	93,449	71,759	80,000	[3]49,360
Lime thousand metric tons	85	81	20	[e]50	[3]14
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	431	417	447	396	[3]445
Gasoline do	2,211	2,136	1,953	1,768	[3]1,901
Jet fuel do	219	312	234	210	[3]231
Kerosine do	1,243	1,119	1,032	861	[3]804
Distillate fuel oil do	3,812	3,413	3,510	3,514	[3]3,600
Residual fuel oil do	4,993	5,137	5,780	5,387	[3]4,732
Lubricants do	39	49	45	46	[3]50
Unspecified do	335	397	349	221	[3]318
Refinery fuel and losses do	235	([7])	43	100	[3]401
Total do	13,518	12,980	13,393	12,503	12,482
Sand and gravel:					
Sand:					
Common thousand metric tons	2,077	[e]2,200	2,964	[e]2,000	2,500
Glass metric tons	1,698	[e]1,700	258,188	[e]200,000	200,000
Gravel thousand metric tons	341	[e]400	410	[e]350	300
Stone:					
Dimension do	87	[e]80	441	[e]450	400
Crushed and broken:					
Alum schist metric tons	11,392	[e]10,000	11,675	[e]11,000	11,000
Dolomite thousand metric tons	110	[e]120	81	[e]100	100
Limestone do	1,190	[e]1,100	1,335	[e]1,250	1,250
Marble do	5	[e]5	8	[e]4	5
Marl metric tons	11,553	[e]10,000	21,862	[e]11,000	10,000
Quartz do	([6])	([6])	7	[e]10	10
Other including ballast thousand metric tons	1,488	[e]1,500	2,028	[e]1,400	1,500
Sulfur, elemental, byproduct[e] metric tons	2,200	2,200	2,200	2,200	2,000
Talc, soapstone, pyrophyllite do	1,724	[e]1,800	2,206	[e]1,700	2,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through July 25, 1983.

[2]In addition to the commodities listed, a variety of crude construction materials (common clays, sand and gravel, and stone) undoubtedly were also produced, but output was not reported, and available information was inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Gem and industrial diamond production was estimated based upon reported total production.

[5]Data represent exports.

[6]Less than 1/2 unit.

[7]Refinery fuel apparently included with products for sale, mainly residual fuel oil and liquefied petroleum gas.

FRENCH GUIANA

The mineral industry of French Guiana, an Overseas Department of Metropolitan France since 1946, was limited in 1982 to the production of small quantities of construction materials used for domestic consumption and a minor quantity of placer gold. This sector has never had a very significant role in the Department's economy, where the shrimp, fishing, timber, rum, and sugar cane industries have been the

mainstays, along with substantial subsidies by the French Government.

In the petroleum sector, Eurafrep S.A., Esso Exploration Guyane S.A.R.L., Société Shell de Recherches et d'Exploration de Guyane, and Société Nationale Elf Aquitaine were reported to have applied for a 5,666-square-kilometer, deep-water concession during the year although no drilling was planned for 1982.

GUYANA

The Guyanese economy continued to decline in 1982 due principally to depressed prices and reduced markets for its principal exports: bauxite, rice, and sugar. Because of a 40% decrease in targeted export earnings, imports fell by 30% causing severe shortages of raw materials and spare parts and fueling a thriving parallel, or black, market.

The production of bauxite and its processing into alumina accounted for about 20% of the GDP, estimated at $416 million,[a] and about 45% of the total annual export earnings, estimated at $94 million.

The Guyanese Government had targeted 1982 bauxite production at 1.8 million tons, 21% below the 2.3-million-ton target of 1981, but 8% above actual 1981 production.

As Guyana's petroleum import bill was approximately 35% to 40% of total merchandise imports, the Government increased its efforts to develop alternative energy sources. Ways to use charcoal, rice husks, and wood waste were studied during the year. For the long term, the Government was planning a 750-megawatt hydroelectric project to be located on the Upper Mazaruni River. Along with the dam and power generating stations, a 150,000-ton-per-year aluminum smelter would be built to use the energy in excess of anticipated domestic consumption. Although the World Bank had determined that the project was technically feasible, its $2 billion cost and its location in the Essequibo area, the territory claimed by Venezuela, make its implementation in the foreseeable future increasingly improbable.

A 45-megawatt hydropower project at Tumatamari has also been proposed to meet Guyana's short-term energy needs. Montreal Engineering Consultants was contracted to carry out both the feasibility study and the final design of the project. However, no portion of the project has been financed beyond the initial design stage. Implementing this project also seems unlikely as the cost has apparently escalated beyond the probability of obtaining necessary financing.

The alumina plant at Linden, owned by the state-owned Guyana Mining Enterprise, was closed in February for rehabilitation and modification to improve quality and obtain better prices. Kaiser Aluminum Technical Service, a unit of Kaiser Aluminum and Chemical Co., was contracted to supervise the work. The work was not completed by yearend, and reportedly, the plant was unlikely to reopen in 1983 because of a shortage of foreign-exchange earnings.

Negotiations were completed near yearend for Guyana to supply bauxite to Venezuela for Interamericana de Alumina S.A.'s new alumina refinery being built at Puerto Ordaz, on the Orinoco River near Ciudad Guayana. The plant was scheduled to start up early in 1983. The bauxite reportedly would not come from the disputed Essequibo region and would be supplanted by Venezuelan bauxite beginning in 1986.

The French Compagnie Generale des Matieres Nucleaires (COGEMA), wholly owned by the French Atomic Energy Authority and engaged in uranium exploration in Guyana since 1979, began exploration drilling in the Mazaruni. Previously, basic geochemical work and aerial and ground surveys were conducted in preliminary exploration. An agreement providing for the payment of royalties, waste disposal, and Guyanese participation in a joint venture was signed early in the year with COGEMA, if uranium is discovered in commercial quantities.

Gold and diamond continued to be mined by small miners—dubbed "pork knockers" because of their method of clearing flies from their dried provisions—during the year in the Essequibo region using hand methods and small diesel-powered suction dredges. Reportedly, while all the resources gleaned from the area were supposed to be sold to or exported through the Government, only about 10% of the gold and perhaps one-half the diamond output actually passed to the state. This continued to lure increasing numbers of foreign prospectors to the area during the year.

Home Oil Co. Ltd. of Canada announced in April the discovery of high-grade oil at its second wildcat well, Karanambo I, in its Takatu Basin concession near the border

with Brazil. However, the unorthodox geology of the field plus Home's inability to obtain financial partners forced the company to shut down in midyear. Home began its wildcat drilling program in the region in November 1981. The first wildcat, Lethem I, was abandoned as dry.

Subsequent to Home's pullout, the Government extended an invitation to Petrobrás Internacional S.A., Petróleo Brasileiro S.A.'s (PETROBRÁS) foreign exploration subsidiary, to drill in the area. PETROBRÁS is Brazil's state oil monopoly, owned 75% by the Government and 25% by private interests.

PARAGUAY

After achieving the highest rate of real GDP growth in Latin America in 1981, the Paraguayan economy experienced a contraction unprecedented for three decades. Official preliminary data indicate that the country's rate of real growth during 1982 fell by 11% from 8.2% to a -2.5%, a performance well below the average attained by Latin American countries as a whole. The decline was primarily caused by the stagnant world economy, low prices for Paraguay's leading exports, currency devaluations in neighboring Argentina and Brazil, and a consequent decline of expenditures in Paraguay owing to the phasing down of construction on the large binational Itaipú hydroelectric project located on the Parana River. The prospects for growth in 1983 appeared little. However, the mining industry, comprising 0.4% of the GDP, expanded 2% in 1982.

Inflation, according to official preliminary figures, decreased to an annual rate of 5.1%, almost two-thirds lower than that of 1981.

The trade gap widened for the eighth consecutive year in 1982, rising 19.5% to $251.7 million.[4] Exports rose 11.6% to $329.8 million on a free-on-board (FOB) basis while imports climbed 14.9% to $581.5 million FOB.

The basic spur for Paraguayan prosperity and the keystone for optimism about the future of its economy was the development of the enormous hydroelectric potential of the Parana River along Paraguay's eastern frontier with Argentina and Brazil.

Construction of the Itaipú powerplant, a binational venture between Paraguay and Brazil, began in 1974 after many years of preparation. The floodgates of the dam were closed October 13, commencing the filling of the 1,350-square-kilometer reservoir. The dam was officially inaugurated in a November 5 ceremony, attended by the Presidents of both countries, in which the 14 spillway gates were opened to mark the culminating stage of construction of the civil works.

By yearend, sources close to the project were indicating that, contrary to the provisions of the original treaty signed in 1973, both countries would be able to sell any excess power that Paraguay does not consume and that Brazil does not want to buy. A treaty revision was expected to be negotiated during 1983. Itaipú's first 700-megawatt turbine was scheduled to be operating at reduced capacity early in 1983, with a second unit becoming operational in midyear. All the power generated was to go initially to Paraguay since completion of transmission lines to São Paulo, Brazil, were about 6 months behind schedule. However, there were indications that the first turbine would not become operational until October or November 1983. Once in full operation, postponed for a year and now scheduled for 1989, Itaipú will be the world's largest hydroelectric power generating plant.

Construction of the main civil works of the binational Yacyretá hydroelectric dam, also located on the Parana River, was delayed throughout the year, thus falling 4 years behind the original schedule. The Ente Binacional Yacyretá, the binational entity that will operate the Yacyretá plant through joint ownership, was negotiating on a joint bid proposal submitted by Argentine and Paraguayan construction firms at yearend.

Reportedly, negotiations were underway at yearend between Reynolds Aluminum International Services Inc., an operating subsidiary of Reynolds Metals Co., and the Government concerning a proposal to build a 140,000-ton-per-year aluminum smelter. The smelter, if built, would use electrical energy generated at Itaipú.

The state-owned Industria Nacional del Cemento signed a contract with the Argentine consulting firm of Insuisa to design the conversion of its two existing wet-process kilns to the dry-process. GATX-Fuller S.A., the Spanish subsidiary of Fuller Co., was awarded a $6-million contract to supply the process equipment, to cut and modify the two existing kilns, and to add four-stage suspension preheaters to each.

SURINAME

The bauxite industry continued to be the mainstay of the Surinamese economy in 1982, contributing about 80% of total export earnings and accounting for about 20% of the GDP, estimated at $1.2 billion.[5] Economic growth continued to decline owing to a steep fall in world demand for bauxite and its derivatives, after sustaining an average annual real growth rate of 5% over the 6-year period ending in 1980. Inflation decreased slightly to an estimated annual rate of 8% from the 14% and 10% annual rates in 1980 and 1981, respectively.

Suriname Aluminum Co. (SURALCO), a wholly owned subsidiary of the Aluminum Co. of America, and N.V. Billiton Maatschappij Suriname, a subsidiary of the Royal Dutch/Shell Group, accounted for an estimated 56% and 38%, respectively, of domestic bauxite production, estimated at 3.1 million tons in 1982. SURALCO's mines are located at Moengo and Lelydorp, whereas Billiton's mines are at Kankantrie and Para. In addition, SURALCO has established an integrated aluminum industry within the country, owning and operating the country's only alumina refinery and aluminum smelter, located in Paranam, based on cheap energy supplied by the 180-megawatt Afobaka hydropower facility near Brokopondo.

Suriname's bauxite exports decreased more than 60%, to 500,485 tons in 1982 compared with 1,281,018 tons in 1981. Total alumina shipments also decreased by almost 10% to 1,055,905 tons compared with 1,171,883 tons in 1981. Exports of aluminum, however, increased more than 90% to 60,294 tons, compared with 31,705 tons in 1981. The United States remained the largest purchaser of Surinamese bauxite and alumina, whereas Europe remained the principal buyer of Suriname's aluminum.

A Governmental decision was deferred on constructing the West Suriname Development Project, despite an estimated $75-million expenditure to date. This project is a multiphased development effort including the building of two large dams to produce more than 500 megawatts of hydroelectricity, a 72-kilometer railroad for transporting bauxite from the presently unexploited deposits in the Bakhuys Mountains to the Corantijn (Courantyne) River Port of Apoera, and a new aluminum smelter at Apoera. Almost two-thirds of the $75 million already expended was used in constructing the railroad, which was inaugurated in 1980 but has not yet been used.

Reportedly, a $15.3-million contract was awarded to Bos Kalis International by Billiton for the removal of 13 million cubic meters of overburden to develop additional bauxite reserves and enable Billiton to continue bauxite production for the remainder of the decade.

Negotiations were successfully concluded during the last quarter for Suriname to supply bauxite to Interamericana de Alumina S.A.'s new alumina refinery under construction at Puerto Ordaz, near Ciudad Guayana, in Venezuela. The refinery was scheduled for startup in early 1983 using imported bauxite from Brazil and Guyana, in addition to that from Suriname. Reportedly, the plant will use bauxite entirely from Venezuela, from the Los Pijiguaos deposits in the east-central region.

URUGUAY

The Uruguayan economy continued to decline in 1982. The GDP decreased an estimated 9% in real terms compared with the 1.3% decline in 1981. Uruguay's economy was expected to remain depressed in 1983. The inflation rate continued to drop for the fourth consecutive year to approximately 20% in 1982 compared with 29% in 1981.

A 33% reduction in imports and a corresponding 22% reduction in exports resulted in a trade deficit of $150 million,[6] a 66% decline from the $437 million deficit registered in 1981.

The mineral industry, limited to the nonmetallic sector, continued to be of minor importance. No significant mineral resources were developed, although studies were in progress on the possibility of exploiting the 30-million-ton iron ore deposit at Arroyo Valentin in the northeastern part of the Department of Florida.

Uruguay's natural resources were mainly limited to hydroelectric power. The Salto Grande hydroelectric plant, a binational venture with Argentina on the Rio Uruguay 338 kilometers north of Buenos Aries, Argentina, began producing energy in 1979. In

August, the 13th of 14 generating turbines became operational. With all turbines installed, the plant will have a total generating capacity of 1,980 megawatts. Work on the 330-megawatt Palmar hydroelectric plant on the Rio Negro was completed during the year. Proposals for two dams on the Rio Yaguaron, as part of a program of developmental and technological cooperation with Brazil, were under study at year-end.

Petroleum exploration in Uruguay remained unsuccessful during the year. Reportedly, Argentina's National Atomic Energy Commission signed an agreement to build a nuclear powerplant in Pando, 30 kilometers northeast of Montevideo. Argentina was to supply the plant with fuel from its uranium mines and processing plants.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Ecuadorean sucres (S/) to U.S. dollars at the rate of S/33=US$1.00.

[3]Where necessary, values have been converted from Guyanese dollars (G$) to U.S. dollars at the rate of G$3=US$1.00.

[4]Where necessary, values have been converted from the Paraguayan guarani (G) to U.S. dollars at the rate of G126=US$1.00.

[5]Where necessary, values have been converted from the Surinamese guilder (Sur.f.) to U.S. dollars at the rate of Sur.f.1.785=US$1.00.

[6]Where necessary, values have been converted from the New Uruguayan peso (NUr$) to U.S. dollars at the rate of NUr$34.00=US$1.00 as of Dec. 31, 1982.

The Mineral Industry of Other South Pacific Islands

By Charlie Wyche[1]

CONTENTS

FIJI

The principal minerals produced in the Dominion of Fiji in 1982 were unrefined gold, silver, and tellurium. The combined value of these commodities was about $16 million,[2] representing over 85% of the total value of mineral output. Cement, sand and gravel, and quarry products were the other minerals produced in Fiji.

Despite the small part played by minerals in Fiji's economy, exploration on land and in the coastal areas was carried out by several international mining companies representing Australian, British, Canadian, West German, and U.S. interests. At the end of 1982, 30 prospecting licenses covering 2,300 square kilometers were issued. Most licenses were for copper, zinc, gold, and silver. Total expenditure on mineral exploration was $3.5 million.

Anglo Pacific Exploration Ltd. holds several prospecting licenses and was the operator of others held by its joint venture partner, Barringer Fiji Ltd. These companies searched for massive sulfide occurrences on Viti Levu Island. Small deposits of copper-zinc-silver mineralization have been discovered, but no orebodies of economic size have been found.

Anglo Pacific's other main exploration program was in the Mount Kasi gold prospecting area of Vanua Levu. Since this exploration program first began in 1978, 47 holes totaling 5,000 meters were drilled. These data were being compiled and evaluated. Exploratory drilling began in a new licensed area at the mouth of the Yanawai River where the potential for placer gold discovery looked promising.

In the Tavua Basin licensed area, Emperor Gold Mining Co. Ltd. continued its exploration program by drilling four holes at the Big Hill prospect. The area lies adjacent to the Emperor Mining Mine and has been a focus for gold exploration for many years. Several gold occurrences have been located in the area, but no economic deposits have been found.

The intensified gold exploration survey by Goldfield Mines Ltd. in the Vunda prospecting area, which began in 1978, was continued. During 1982, over 20 holes were drilled in several areas up to depths of 150 meters. A deposit with grades of up to 0.24 troy ounce of gold per ton was discovered.

Exploration for porphyry copper deposits led to the discovery of the Waisoi deposit in the Namosi District of southeast Viti Levu. Prefeasibility investigations of the deposit

demonstrated the existence of 475 million tons of minable reserves at a grade of 0.48% copper together with minor amounts of recoverable gold and molybdenum.

Table 1.—Other South Pacific Islands: Production of mineral commodities[1]

Area and commodity	1978	1979	1980	1981[p]	1982[e]
FIJI					
Cement, hydraulic metric tons	82,000	[r]96,100	84,367	91,625	95,250
Gold, mine output, metal content troy ounces	28,065	25,656	23,934	30,595	35,000
Lime[2] metric tons	835	1,308	2,128	4,270	4,500
Silver, mine output, metal content troy ounces	10,415	10,656	6,768	8,057	9,000
Stone, sand and gravel:					
Coral sand for cement manufacture metric tons	88,104	120,000	105,436	93,514	95,000
River sand for cement manufacture do	59,515	70,683	30,631	27,307	28,000
River sand and gravel, n.e.s cubic meters	310,041	367,700	370,000	375,000	380,000
Quarried stone do	[e]120,000	205,071	274,000	210,000	230,000
Tellurium metal kilograms	[e]22,700	[e]22,700	11,350	--	--
KIRIBATI[3]					
Phosphate rock (all produced on Banaba Island, formerly Ocean Island) thousand metric tons	465	420	--	--	--
NAURU[3]					
Phosphate rock do	1,999	1,828	2,087	[4]1,480	[4]1,359
NEW CALEDONIA					
Cement metric tons	[r]50,801	56,650	55,927	50,154	53,191
Chromium: Chromite, gross weight do	8,229	[r]12,281	2,188	4,270	49,825
Cobalt, mine output:					
Content by analysis[5] do	[r]1,745	[r]2,154	2,318	2,090	2,123
Recovered[6] do	155	210	180	140	500
Nickel:					
Ore:					
Gross weight thousand metric tons	3,349	4,300	4,571	3,984	3,050
Metal content[7] metric tons	65,171	80,464	86,592	78,090	79,300
Metallurgical products:					
Ferronickel:					
Gross weight do	77,908	123,306	131,281	109,679	109,750
Metal content (nickel plus cobalt) do	19,889	30,373	32,580	27,989	28,006
Nickel matte:					
Gross weight do	22,521	16,282	20,779	20,643	9,600
Metal content (nickel plus cobalt) do	17,103	12,262	15,479	15,380	7,144
Stone, sand and gravel:					
Stone:					
Crude (unspecified) cubic meters	26,000	104,051	104,706	19,422	NA
Crushed do	166,000	73,435	140,079	83,000	NA
Sand do	63,000	67,797	95,814	75,802	NA
Silica (for metallurgical use) do	12,405	15,683	12,375	24,650	NA
PAPUA NEW GUINEA[3]					
Copper, mine output, metal content metric tons	198,603	170,788	146,813	[4]165,420	[4]170,004
Gold, mine output, metal content troy ounces	751,265	630,496	451,707	[4]540,325	[4]563,538
Silver, mine output, metal content do	1,680,800	1,428,480	1,180,000	[4]1,362,804	[4]1,385,399
SOLOMON ISLANDS[3]					
Gold do	[e]400	1,076	1,093	[4]1,050	1,110
Silver do	NA	115	161	[4]150	200
VANUATU					
Manganese:					
Ore metric tons	133,000	112,400	--	--	--
Concentrate do	20,732	10,544	--	--	--

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 26, 1983.

[2]Produced from an unreported amount of domestically quarried limestone.

[3]In addition to the commodities listed, crude construction materials (common clays, sand and gravel, and stone) are produced, but output is not reported quantitatively, and available general information is inadequate to make reliable estimates of output levels.

[4]Reported figure.

[5]Total cobalt content of nickel ores mined based on average nickel-cobalt ratio in metallurgical products for 1880-1972.

[6]Cobalt actually recovered for use as cobalt; excludes cobalt content of nickel-cobalt alloys and/or included in ferronickel.

[7]Nickel-cobalt content of ore produced as reported by New Caledonia's Mines Service. Of the total, about 97.323% is nickel; the balance is cobalt (based on average nickel-cobalt ratio in metallurgical products for 1880-1972).

COMMODITY REVIEW

Metals.—Emperor Mining produced sulfotelluride gold ores at Vatukoula throughout 1982. The company employed about 750 workers to mine and treat 370,000 tons of ore and recovered 35,000 troy ounces of gold and 9,500 troy ounces of silver. The increased output over that of 1981 was attributed to a new telluride plant, a carbon-in-pulp circuit in the mill, the absence of labor disputes, and an increase in the underground workforce. Since 1933, the mine at Vatukoula has produced 3.8 million troy ounces of gold and 1.3 million troy ounces of silver.

Emperor Mining's ore reserves at yearend, using a cutoff grade of 0.2 ounce of gold per ton, totaled 600,000 tons of measured ore at an average grade of 0.29 ounce of gold per ton. Indicated ore reserves totaled 187,000 tons at an average grade of 0.25 ounce of gold per ton.

Nonmetals.—Emperor Mining continued to produce burnt lime from its limestone quarry at Tau.

Fiji Industries Ltd. dredged 300,000 tons of coral sand from Suva Harbor and 100,000 tons of common sand and gravel from the Rewa River and its tributaries. Several tons of quarried stone was also recovered.

The Government's Mineral Resources Div. continued evaluating a phosphate clay deposit on Tuvutha Island where 1.5 million tons of 10% P_2O_5 was reported.

Mineral Fuels.—Fiji has no known deposits of oil or gas. However, Mapco Ltd. and Pacific Energy and Minerals Ltd. were drilling for oil and gas in Bligh Waters and Yasawa. The country possesses large offshore platform areas with water depths of less than 250 meters.

Table 2.—Fiji: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	17	14	--	Australia 13.
Copper: Metal including alloys:				
Scrap	111	101	--	All to Australia.
Unwrought and semimanufactures	22	14	--	Mainly to Australia.
Gold:				
Ore and concentrate, value	$380	--		
Waste and sweepings, do.	$12,173	--		
Bullion, troy ounces	25,013	28,143	--	Mainly to Australia.
Metal including alloys, unwrought and partly wrought, do.	64	--		
Iron and steel: Metal:				
Scrap	1,771	1,883	--	All to New Zealand.
Steel, primary forms	34	1	--	All to Tonga.
Semimanufactures[1]	736	541	--	American Samoa 218; Tonga 166.
Lead: Metal including alloys:				
Scrap	124	28	--	All to Australia.
Unwrought	304	26	--	Do.
Semimanufactures, value	$3,268	$38	--	Mainly to Tonga.
Silver:				
Waste and sweepings, do.	$3,058	--		
Bullion, troy ounces	7,450	8,330	--	All to Australia.
Metal including alloys, unwrought and partly wrought, value	--	$5,860	--	All to New Zealand.
Tin: Metal including alloys, semimanufactures, do.	$800	--		
Titanium: Oxides	2	--		
Zinc: Metal including alloys, semimanufactures, value	$9,733	$164	--	All to Kiribati.
Other:				
Ores and concentrates	1	--		
Oxides and hydroxides	845	--		
Ashes and residues	51	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural and artificial powders and grains, value	$44	$1,673	--	Australia $763; Western Samoa $482; Tuvalu $397.

See footnotes at end of table.

Table 2.—Fiji: Exports and reexports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Abrasives, n.e.s. —Continued				
Grinding and polishing wheels and stones ---------- value	$911	$292	--	Kiribati $111; Tuvalu $107; Line Islands $74.
Cement ----------	1,820	1,113	--	American Samoa 642; Tuvalu 296; Wallis and Futuna 100.
Chalk ----------	290	--		
Clays and clay products:				
Crude ----------	44	(2)	--	All to Wallis and Futuna.
Products:				
Nonrefractory ---------- value	$6,822	$5,407	--	Kiribati $3,744; Tuvalu $1,600; Western Samoa $63.
Refractory including nonclay brick do	$1,869	$12	--	NA.
Diatomite and other infusorial earth	2	--		
Fertilizer materials: Manufactured, unspecified and mixed ----------	5	--		
Graphite, natural ----------	12	--		
Lime ----------	1	--		
Precious and semiprecious stones other than diamond ---------- value	$289	$5,989	--	Australia $5,538; New Caledonia $451.
Salt and brine ----------	6	10	--	Mainly to Line Islands.
Sodium and potassium compounds, n.e.s.:				
Sodium hydroxide ---------- kilograms	16	--		
Stone, sand and gravel:				
Gravel and crushed rock ----------	86	1	--	Mainly to New Zealand.
Sand other than metal-bearing ----------	128	--		
Sulfur: Sulfuric acid ---------- value	$237	$80	--	All to Tuvalu.
Other:				
Crude ----------	17	--		
Slag and dross, not metal-bearing ----------	12	--		
Oxides and hydroxides of barium, magnesium, strontium ---------- value	$604	$1,074	--	Mainly to New Zealand.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals do	$252	$90	--	Tonga $49; Tuvalu $41.
Unspecified ---------- do	$1,466	$1,242	--	All to Western Samoa.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural ----------	20	--		
Hydrogen, helium, rare gases ----------	9	3	--	Mainly to Kiribati.
Petroleum refinery products:				
Nonbunker:				
Liquefied petroleum gas 42-gallon barrels	71	93	--	Kiribati 46; Line Islands 35.
Gasoline:				
Aviation ---------- do	20,303	9,371	--	Kiribati 3,253; Cook Islands 2,021; Vanuatu 1,653.
Motor ---------- do	129,365	130,472	--	Tonga 36,617; Western Samoa 29,340; Vanuatu 20,592.
Kerosine and jet fuel ---------- do	176,045	663,584	--	Tonga 63,465; Western Samoa 26,746; Tahiti 23,659; Line Islands 16,835.
Distillate fuel oil ---------- do	208,934	322,733	--	Tonga 49,345; Vanuatu 36,323; Western Samoa 29,379.
Lubricants ---------- do	281	1,218	--	Tonga 160; Line Islands 74.
Naphtha ---------- do	1,937	1,384	--	Tonga 1,023; Western Samoa 359.
Unspecified ---------- do	45	17	--	Kiribati 8; Tahiti 5; Tuvalu 3.
Bunker:				
Gasoline:				
Aviation ---------- do	170	405	--	NA.
Motor ---------- do	605	1,394	--	NA.
Kerosine and jet fuel ---------- do	553,534	477,949	--	NA.
Distillate fuel oil ---------- do	151,149	125,996	--	NA.
Lubricants ---------- do	1,195	857	--	NA.
Residual fuel oil ---------- do	63,432	49,263	--	NA.
Unspecified ---------- do	12	1	--	NA.
Tars and other crude chemicals derived from coal, gas, and petroleum ---------- value	$163	$598	--	Line Islands $172.

NA Not available.

[1]Totals exclude unreported quantity valued at $9,500 in 1980 and $21,430 in 1981.

[2]Less than 1/2 unit.

Table 3.—Fiji: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	380	485	2	New Zealand 276; Australia 121; Hong Kong 78.
Copper: Metal including alloys:				
Scrap	31	--		
Unwrought and semimanufactures	114	89	2	Australia 37; New Zealand 37; United Kingdom 10.
Gold:				
Waste and sweepings, value	$324	--		
Metal including alloys, unwrought and partly wrought, troy ounces	411	1,161	39	Singapore 457; United Kingdom 369; Australia 209.
Iron and steel:				
Metal:				
Scrap	7	18	--	All from Australia.
Pig iron, cast iron, related materials	102	62	--	China 30; New Zealand 16; Australia 15.
Ferroalloys	14	5	(1)	Australia 4; Norway 1.
Steel, primary forms	11,221	8,413	22	Australia 5,676; New Zealand 2,643; Japan 64.
Semimanufactures:				
Bars, rods, angles, shapes, sections	6,827	4,586	6	New Zealand 2,333; Japan 1,211; Australia 441.
Universals, plates, sheets	11,422	10,936	11	Australia 5,187; New Zealand 3,847; Japan 1,013.
Hoop and strip	1,703	434	1	Australia 400; New Zealand 30.
Rails and accessories, value	$209,474	$680,582	--	Japan $355,342; Australia $170,454; United Kingdom $93,742.
Wire	3,579	1,880	3	Australia 1,307; New Zealand 432; China 63; Japan 62.
Tubes, pipes, fittings[2]	5,732	7,589	1	Australia 3,583; Switzerland 2,148; Taiwan 770; Japan 455.
Castings and forgings, rough	5	1	--	Mainly from Japan.
Lead: Metal including alloys:				
Scrap, kilograms	50	8,825	--	All from Australia.
Unwrought and semimanufactures, value	$259,212	$69,168	$39	New Zealand $38,639; Australia $21,621; United Kingdom $5,998.
Magnesium: Metal including alloys, unwrought, do	$13	--		
Nickel:				
Matte and speiss, kilograms	150	--		
Metal including alloys, all forms, do	400	42	--	All from Australia.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, troy ounces	r9	(1)	--	All from New Zealand.
Silver:				
Bullion, do	6	8	--	All from Switzerland.
Metal including alloys, unwrought and partly wrought, value	$25,568	$6,280	$1,696	Australia $4,123; New Zealand $461.
Tin: Metal including alloys:				
Scrap, kilograms	1	500	--	All from Australia.
Unwrought and semimanufactures, value, thousands	$1,415	$2,520	--	Japan $2,479; New Zealand $34.
Titanium: Oxides	211	186	16	Australia 169.
Zinc:				
Blue powder, value	$60,466	$65,952	--	Mainly from Australia.
Metal including alloys:				
Scrap, kilograms	8	6	--	All from Australia.
Unwrought	76	41	--	Mainly from Australia.
Semimanufactures, value	$37,678	$67,596	--	Mainly from New Zealand.
Other:				
Ores and concentrates, kilograms	305	--		
Oxides and hydroxides	60	111	17	Australia 61; West Germany 19; United Kingdom 8.
Ashes and residues	18	(1)	--	Mainly from India.
Base metals including alloys, all forms, value	$131	$9	--	All from Australia.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc.	5	(1)	--	All from United Kingdom.
Dust and powder of precious and semiprecious stones, value	$151	$136,566	$1,710	Australia $71,468; New Zealand $57,227.
Grinding and polishing wheels and stones, value, thousands	$126	$148	$4	Australia $68; New Zealand $45; United Kingdom $17.
Asbestos, crude, kilograms	25	1,000	--	All from New Zealand.
Barite and witherite	r124	13	(1)	New Zealand 8; Australia 2; United Kingdom 2.
Cement	785	9,239	(1)	New Zealand 9,224.

See footnotes at end of table.

Table 3.—Fiji: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS—Continued				
Chalk	143	128	--	Australia 46; New Zealand 43; United Kingdom 36.
Clays and clay products:				
Crude	244	147	6	New Zealand 71; Australia 70.
Products:				
Nonrefractory, value, thousands	$782	$979	$10	United Kingdom $263; Japan $196; Taiwan $96.
Refractory including nonclay brick, do	$389	$264	--	Australia $137; New Zealand $99.
Cryolite and chiolite, kilograms	200	--	--	
Diamond: Industrial, value	--	$10,284	--	All from Belgium-Luxembourg.
Diatomite and other infusorial earth	81	62	45	Australia 14.
Fertilizer materials: Manufactured:				
Nitrogenous	40,979	48,215	72	Japan 42,277; North Korea 5,097; Australia 385.
Phosphatic	9,309	11,645	--	Japan 6,507; Republic of Korea 2,550; North Korea 2,000.
Potassic	2,767	4,389	--	New Zealand 2,682; Republic of Korea 1,500.
Unspecified and mixed	639	1,089	1	West Germany 559; New Zealand 507; Australia 22.
Graphite, natural, kilograms	105	1,782	--	Mainly from Australia.
Gypsum and plaster	122	1,335	(1)	Australia 1,313.
Halogens: Unspecified, value	$374,600	$372,945	$41,484	Australia $127,693; New Zealand $76,157; West Germany $49,887; Japan $37,685.
Lime	73	36	--	Mainly from New Zealand.
Magnesium compounds: Magnesite	4	(1)	--	All from Australia.
Mica:				
Crude including splittings and waste	5	3	--	Do.
Worked including agglomerated splittings, value	$1,114	$2,051	--	Australia $1,295; Japan $742.
Nitrates, crude	--	18	--	All from Australia.
Potassium salts, crude	12	(1)	--	Do.
Precious and semiprecious stones other than diamond: Natural, value	$40,700	$119,145	$48,235	Australia $40,330; New Zealand $16,506.
Salt and brine	2,272	3,821	1	West Germany 2,301; Netherlands 575; United Kingdom 344; New Zealand 263.
Sodium and potassium compounds, n.e.s.:				
Sodium hydroxide	1,591	2,394	1	United Kingdom 2,089; New Zealand 283.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3	27	--	Mainly from New Zealand.
Worked, value	$52,326	$31,158	--	New Zealand $16,983; Spain $6,176; Italy $3,990; Australia $1,411.
Dolomite, chiefly refractory-grade	5	--	--	
Gravel and crushed rock	2	8	--	New Zealand 6; Australia 2.
Quartz and quartzite	2	1	--	All from New Zealand.
Sand other than metal-bearing	80	156	--	New Zealand 139; Australia 17.
Sulfur:				
Elemental:				
Crude including native and byproduct	3	128	--	New Zealand 72; United Kingdom 55.
Colloidal, precipitated, sublimed, kilograms	1	2	--	All from Australia.
Sulfuric acid, value	$119,075	$65,531	$7,821	New Zealand $38,145; Australia $19,330.
Talc, steatite, soapstone, pyrophyllite	10	23	--	New Zealand 21.
Other:				
Crude	9	40	21	New Zealand 18.
Slag and dross, not metal-bearing	11	3	--	Australia 2; India 1.
Oxides and hydroxides of barium, magnesium, strontium, value	$135,156	$224,688	$2,785	Australia $156,209; New Zealand $34,454; Japan $20,738.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals, do	$723,305	$731,850	--	New Zealand $695,417; Australia $31,803.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	652	2,097	--	Japan 1,722; New Zealand 374.
Coal, all grades including briquets	21,141	18,354	1	New Zealand 9,620; Australia 8,733.
Hydrogen, helium, rare gases	62	67	24	Australia 24; United Kingdom 19.
Petroleum and refinery products:				
Crude, 42-gallon barrels	1	--		
Refinery products:				
Liquefied petroleum gas, do	31	35	(1)	Mainly from Australia.
Gasoline:				
Aviation, thousand 42-gallon barrels	19	12	--	All from Australia.
Motor, do	473	494	--	Australia 343; Singapore 151.

See footnotes at end of table.

Table 3.—Fiji: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum and refinery products —Continued				
Refinery products —Continued				
Mineral jelly and wax thousand 42-gallon barrels	1	1	(1)	Mainly from China and Japan.
Kerosine and jet fuel do.	801	957	--	Australia 729; Singapore 228.
Distillate fuel oil do.	1,425	1,520	--	Australia 1,194; Singapore 326.
Lubricants do.	29	36	(1)	Australia 30; New Zealand 5.
Naphtha do.	22	30	(1)	Australia 17; Singapore 13.
Residual fuel oil do.	133	87	--	All from Australia.
Bituminous mixtures do.	1	1	(1)	Mainly from Japan.
Tars and other crude chemicals derived from coal, gas, and petroleum value	$85,894	$106,052	$10,270	New Zealand $64,277; Australia $15,503; Singapore $14,788.

ʳRevised.
[1]Less than 1/2 unit.
[2]Totals exclude unreported quantities valued at $1,732,800 in 1980 and $1,449,579 in 1981.

NAURU AND KIRIBATI

The Republic of Nauru and Kiribati lie just south of the equator, halfway between Honolulu, Hawaii, and Melbourne, Australia. Kiribati won independence from the United Kingdom in 1979 and is composed of Ocean, Gilbert, Line, and Phoenix Islands.

Phosphate rock produced in Nauru by Nauru Phosphate Corp. was 1.36 million tons, whereas Kiribati reported no production. Nauru exported 68% of its output to Australia, 24% to New Zealand, and the remainder to Japan and the Republic of Korea. The phosphate rock was mined on land between limestone pinnacles using grab buckets. Reserves of phosphate rock in Nauru were estimated at 32 million tons.

NEW CALEDONIA

Output of nickel ore, the principal mineral produced on the French territory island of New Caledonia, declined. Production of nickel matte by Société Métallurgique le Nickel (SLN), New Caledonia's only nickel operator, declined significantly, but output of ferronickel remained at about the 1981 level. Cobalt matte, a byproduct of nickel smelting operations, was also produced. Other minerals produced included chromite and construction materials.

The nickel laterite ore of New Caledonia was among the richest in the world with a minimum grade of 2.4%. Four major mines, located at Kouaoua, Poro, Thio, and Népoui, and a number of small mines supplied ore to the Doniambo smelter complex, which produced ferronickel and nickel matte. Most of the matte was shipped to SLN's refinery at Sandouville, France.

About 150 tons of byproduct cobalt was produced in New Caledonia in 1982. The cobalt, in nickel matte, was recovered as cobalt metal or as a compound. A significant quantity of the cobalt remained in the nickel products.

Inco Ltd. of Canada, in partnership with two French companies, began mining and processing chromite at Tiebaghi in the northern part of New Caledonia. During the year, 49,800 tons of chromite concentrate with an average Cr_2O_3 content of 48% to 56% was produced. The French companies, Banque de Paris and Compagnie Minière Dong-Trieu, have 45% of the equity in the operation, and Inco holds the rest. The initial plan was to produce 450 tons of ore per day to feed a nearby processing plant with an annual capacity of 110,000 tons. The reduction plant has an annual capacity of 85,000 tons of chromite products. The development cost of the project was $14 million.[3]

Inco continued to consider the development of lateritic nickel deposits in the southern part of the island. In accordance

with Government policy, Inco will be required to have a French partner before development begins.

Over 85% of the electric power generated in New Caledonia was consumed by SLN in its mining and smelting operations. New Caledonia has no domestic energy resources. Light fuels were imported from Singapore; fuel oil, from Australia; and industrial fuel, from Bahrain. The Plaine des Lacs region was considered to have hydroelectric development potential.

Table 4.—New Caledonia: Exports and reexports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, unwrought and semimanufactures	(1)	11	--	All to Australia.
Copper:				
Matte and speiss	208	217	--	Do.
Metal including alloys, semimanufactures	1	(1)	--	All to Wallis and Futuna.
Iron and steel: Metal:				
Scrap	2,453	722	--	All to New Zealand.
Ferroalloys: Ferronickel	128,796	110,036	20,991	France 68,556; Japan 15,194.
Steel, primary forms	--	1	--	All to Wallis and Futuna.
Semimanufactures	246	130	--	Wallis and Futuna 73; Vanuatu 55.
Lead: Metal including alloys, unwrought	6	--		
Nickel:				
Ore and concentrate thousand tons	1,910	1,385	--	Japan 1,384.
Metal including alloys, unwrought	21,980	25,249	3,281	France 19,093; Japan 2,875.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$35	--		
Zinc: Metal including alloys, semimanufactures	--	2	--	All to Wallis and Futuna.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones value, thousands	$1	--		
Cement	13	--		
Clays and clay products: Products:				
Nonrefractory	46	52	--	Wallis and Futuna 44; Vanuatu 7.
Refractory including nonclay brick	8	56	--	Wallis and Futuna 46; Vanuatu 9.
Diatomite and other infusorial earth	--	17	--	All to Japan.
Precious and semiprecious stones, other than diamond -- value, thousands	--	$1	--	Do.
Salt and brine	2	2	--	All to Wallis and Futuna.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	(1)	1	--	All to French Polynesia.
Gravel and crushed rock	70	--		
Other: Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	--	1	--	All to Vanuatu.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	10	--	All to Wallis and Futuna.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	220	209	--	Do.
Gasoline do	26	--		
Kerosine and jet fuel do	16	--		
Lubricants do	406	330	--	Wallis and Futuna 210; ship stores 91.
Residual fuel oil do	(1)	--		
Bituminous mixtures do	803	903	--	Vanuatu 848; Wallis and Futuna 55.

[1]Less than 1/2 unit.

Table 5.—New Caledonia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
METALS				
Alkaline- and rare-earth metals: Unspecified value, thousands	$1	$1	--	All from France.
Aluminum:				
Oxides and hydroxides	--	3	--	Do.
Metal including alloys, unwrought and semimanufactures	234	387	(1)	New Zealand 168; Italy 69; France 67.
Chromium: Oxides and hydroxides	1	1	--	Mainly from Australia.
Copper:				
Matte and dross value, thousands	$3	$3	--	All from France.
Metal including alloys, semimanufactures	33	48	1	France 40; New Zealand 5.
Iron and steel: Metal:				
Scrap	11	2	--	All from Australia.
Pig iron, cast iron, related materials	81	--		
Ferroalloys, unspecified	59	100	--	Republic of South Africa 61; Australia 39.
Steel, primary forms value, thousands	--	$1	--	All from West Germany.
Semimanufactures:				
Bars, rods, angles, shapes, sections	5,162	5,324	--	France 4,064; West Germany 601; New Zealand 346.
Universals, plates, sheets	5,107	4,495	--	Australia 1,827; France 840; Belgium-Luxembourg 820.
Hoop and strip	163	362	--	France 137; Australia 129; Netherlands 89.
Rails and accessories	4	98	--	All from France.
Wire	670	560	--	New Zealand 322; Australia 176.
Tubes, pipes, fittings	2,040	2,711	3	France 1,555; West Germany 777; Canada 175.
Castings and forgings, rough	78	22	--	All from France.
Lead:				
Oxides	1	1	--	Do.
Metal including alloys, unwrought and semimanufactures	29	32	--	Australia 21; France 10.
Molybdenum: Metal including alloys, all forms value, thousands	--	$1	--	All from France.
Nickel:				
Ore and concentrate	--	1	--	Do.
Metal including alloys, semimanufactures value, thousands	--	$3	--	Ireland $2; France $1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought do	--	$1	--	All from France.
Silver: Metal including alloys, unwrought and partly wrought do	$20	$17	$1	France $13; West Germany $2.
Tin: Metal including alloys, unwrought and semimanufactures	2	1	(1)	Mainly from France.
Titanium: Oxides	--	15	--	All from France.
Zinc: Metal including alloys, unwrought and semimanufactures	9	9	--	Do.
Other: Base metals including alloys, all forms	(1)	2	--	Do.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc. value, thousands	$1	$1	--	Do.
Grinding and polishing wheels and stones	8	14	(1)	France 5; West Germany 4.
Barite and witherite	--	2	--	All from France.
Cement	48,098	43,428	--	Japan 43,069.
Chalk	--	20	--	All from France.
Clays and clay products:				
Crude, unspecified	23	29	--	West Germany 18; France 5; Australia 4.
Products:				
Nonrefractory	1,844	1,422	--	Italy 959; France 263; Spain 157.
Refractory including nonclay brick	5,703	7,775	27	France 3,449; Austria 1,297; West Germany 1,238.
Diatomite and other infusorial earth	8	20	18	Australia 1.
Fertilizer materials:				
Crude, n.e.s	5	1	--	Mainly from New Zealand.
Manufactured:				
Ammonia	10	4	--	Australia 2; France 2.
Nitrogenous	2,454	2,496	1	France 2,129; Australia 128; Japan 118.
Phosphatic	--	55	--	Australia 54.
Potassic	1,644	111	--	Belgium-Luxembourg 108.
Unspecified and mixed	89	45	1	France 33.
Gypsum and plaster	15,778	30,383	--	Australia 28,951; France 1,432.
Halogens: Unspecified	11	8	--	Australia 7.
Lime	1,124	14	--	Australia 9; France 5.
Magnesium compounds: Magnesite	--	17	--	All from Australia.
Pigments, mineral: Iron oxides and hydroxides, processed	4	--		

See footnotes at end of table.

Table 5.—New Caledonia: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981	
			United States	Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond value, thousands	$168	$128	$1	France $95; Belgium-Luxembourg $10; Uruguay $5.
Salt and brine	518	440	--	Australia 160; France 137; West Germany 136.
Sodium and potassium compounds, n.e.s.:				
Potassium hydroxide including sodic and potassic peroxides	(1)	2	--	Italy 1.
Sodium hydroxide	81	55	--	France 53.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	173	108	--	France 84; Italy 18.
Worked	60	55	--	Republic of South Africa 33; France 11.
Gravel and crushed rock	22	80	--	France 52; Italy 27.
Sand other than metal-bearing	59	21	5	Australia 8; France 8.
Sulfur:				
Elemental, crude including native and byproduct	--	5,445	--	All from Canada.
Sulfuric acid	50	39	--	France 22; Australia 17.
Talc, steatite, soapstone, pyrophyllite	1	1	--	All from France.
Other:				
Crude	115	81	--	New Zealand 77.
Slag and dross, not metal-bearing	22	--		
Oxides and hydroxides of barium, magnesium, strontium	--	1	--	All from France.
Building materials of asphalt, asbestos and fiber cements, unfired nonmetals	410	536	--	France 492; Austria 22; Italy 17.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades excluding briquets	119,799	82,351	--	Republic of South Africa 57,783; Australia 24,568.
Coke and semicoke	36	--		
Peat including briquets and litter	22	7	--	All from New Zealand.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	58,742	55,692	--	Australia 55,610.
Gasoline do	806,939	747,099	NA	NA.
Mineral jelly and wax do	8	8	--	Mainly from France.
Kerosine and jet fuel do	30,380	30,814	NA	NA.
Lubricants do	24,395	17,990	406	Australia 16,646.
Residual fuel oil thousand 42-gallon barrels	2,949	1,924	344	Bahrain 1,579.
Bitumen, other residues, bituminous mixtures do	21	11	(1)	Mainly from Singapore.
Tars and other crude chemicals derived from coal, gas, and petroleum	54	77	--	Australia 68.

NA Not available.
[1]Less than 1/2 unit.

PAPUA NEW GUINEA

The mining industry, particularly the Panguna Mine on the Island of Bougainville, has been one of the mainstays of the economy of Papua New Guinea. Although extensive exploration has been underway in Papua New Guinea for many years, Bougainville Copper Ltd. (BCL) remained essentially the country's only metal producing mining company. Gold and copper from the Panguna Mine were major sources of foreign exchange, accounting for over 40% of export earnings in 1982. Values of mineral output were as follows: copper, $185 million;[4] gold, $120 million; and silver, $7 million. These values represented 20% of the gross domestic product. Despite the mineral industry's financial importance, it employed only 10,000 of Papua New Guinea's workforce of 370,000.

The production of small quantities of

alluvial gold, by panning, and sand in the Bulolo Wau area was the only other major mineral activity. This was expected to change by 1985, as development of several major mines was scheduled for completion. One of these was the $1.6 billion Ok Tedi copper and gold mine in the Star Mountains in western Papua New Guinea. The first stage was scheduled for completion in July 1984 when gold production commences. Other mines scheduled to be producing later this decade are the Porgera gold mine, the Frieda River copper mine, and the Ramu River chromite and nickel mine.

The investment climate in Papua New Guinea has been favorable, and the Government promised even greater cooperation in the future. A new department, specifically responsible for industrial development, was created to assist investors with Government policies and new legislation affecting the mining industry. In the future, potential investors will quickly know the investment climate and opportunities where a majority of foreign equity is required. In general, the basic policies related to exploitation of minerals, including petroleum, were as follows: mineral resources belong to the Papua New Guinean people and the Government, and they must receive a fair return on extraction of minerals; foreign enterprises exploiting Papua New Guinea's mineral resources deserve a reasonable return on investment but gains beyond this will go to the Government; and the Government can regulate extractive enterprises to maximize benefits for local communities while minimizing harmful social and economic costs.

COMMODITY REVIEW

Metals.—*Chromite.*—The joint venture company of Nord Resources (69.5%) and MIM Holdings Ltd. (30.5%) completed prefeasibility studies at its Ramu River chromite-nickel-cobalt deposit. The three-layer lateritic deposit with the chromite layer overlying the cobalt and nickel layers has reserves of 225 million tons. The 10-foot-thick upper layer contains 107 million tons of sandy clay, 9% metallurgical-grade chromite.

The second layer, a 9-foot-thick limonitic laterite, has reserves of 82 million tons grading 1.12% nickel, 0.16% cobalt, and 6% chromite. The third layer, a 15-foot saprolite zone, has reserves of 35 million tons grading 1.46% nickel and 0.06% cobalt. Studies were being undertaken to determine a millsite.

Amax Exploration Australia Inc., a subsidiary of AMAX Inc., was evaluating chromite and other minerals found in beach sands along the Marobe coast (north Papua New Guinea), between the towns of Salamaua and Salua.

Copper.—The major copper deposits, Bougainville, Ok Tedi, and Frieda River, are with associated gold, silver, and/or molybdenum. The 1982 output of copper, gold, and silver at the Panguna Mine (Bougainville) was above the 1981 level. However, the mine encountered problems of declining grade and higher production cost. Since 1972, the grade of copper has decreased from 0.75% to less than 0.45%, gold has halved to 0.015 ounce per ton, and silver has declined from 0.066 ounce per ton to 0.043 ounce per ton. To offset the decreasing grade, the company installed an additional ball mill in 1982, which increased productivity. The ball mill was scheduled for 1983. About 43 million tons of ore was mined from the Panguna open pit in 1982, and the waste-to-ore ratio rose to 1.15:1. In 1982, sales totaled 159,000 tons of copper, 560,000 ounces of gold, and 1.4 million ounces of silver. Concentrates were shipped under long-term contracts to Japan, the Federal Republic of Germany, and Spain.

Ore reserves at Panguna were placed at 580 million tons averaging 0.40% copper and 0.015 ounce of gold per ton. Reserves are sufficient for the next two decades, but the company was actively exploring for new deposits.

Development work at the Ok Tedi copper-gold mine continued. Gold production was expected to commence in late 1984, and copper production in 1986. A joint venture of The Broken Hill Pty. Co. Ltd., Amoco Minerals Ltd., and three West German companies own and will operate the mine, which is located in the Star Mountain in the western highlands of Papua New Guinea near the border of Indonesia. The mine is 800 kilometers from the southern coast via the Fly River. Ok Tedi reserves are comprised of 34 million tons of gold ore having an average grade of 0.09 ounce of gold per ton, 315 million tons of porphyry copper ore averaging 0.7% copper with some molybdenum, and 25 million tons of skarn containing 1.17% copper. The gold ore is principally leached cap rock above the porphyry copper.

Exploration continued on the Frieda River porphyry orebody located in the Western Sepik Province, about 80 kilometers

northwest of the Ok Tedi Mine. Mineral reserves were estimated at 500 million tons of ore averaging 0.5% copper. A consortium of MIM Holdings of Australia (30%), Furukawa Mining Co. Ltd. and Metal Mining Agency of Japan (25%), Norddeutsche Affinerie AG of the Federal Republic of Germany (5%), Conzinc Riotinto of Australia Ltd. (20%), and the Papua New Guinean Government (20%) have been exploring the deposit. ASARCO Incorporated of the United States has a 49% interest in MIM Holdings.

A high-grade, massive sulfide deposit has been discovered and was being delineated a few kilometers away from the Frieda River orebody. This deposit is called the Nena project.

Exploration by Exoil NL and Transoil NL on Manus Island has indicated 160 million tons of 0.32% copper ore with associated gold, silver, and molybdenum mineralization. The existing infrastructure and good accessibility relative to the mainland deposits favor the prospects for developing the Manus Island deposit.

Gold and Silver.—Essentially all of Papua New Guinea's gold and silver was produced at BCL's Panguna copper mine. Gold production totaled 564,000 troy ounces and silver recovery totaled 1.4 million troy ounces.

Placer Development Ltd., MIM Holdings, and Consolidated Goldfields of Australia were jointly exploring and developing an alluvial gold deposit at Porgera in Papua New Guinea's central mountain range. Two zones were being explored. One zone was 250 meters long, 150 meters wide, and 250 meters deep, with an average of 0.07 ounce of gold and 0.13 ounce of silver per ton. The other zone has a length of 420 meters, a width of 250 meters, a depth of 240 meters, and an average of 0.08 ounce of gold and 0.13 ounce of silver per ton. The joint venture partners commissioned Fluor Mining & Metals Inc. to assess the potential for an economic operation based on gold mineralization only. Fluor reported that, because of the complexity of the ore, an expensive plant would be required for an acceptable recovery. Also, the cost of development in this isolated location may make it uneconomical. Exploration was continuing with the hope of finding higher grade mineralization.

Mineral Fuels.—Papua New Guinea reported no significant production of oil or gas, but exploration work was started in 1982. Recent survey results indicated that some geological structures had potential for substantial hydrocarbon reserves. Three exploration concession licenses were awarded during the year, and 11 licenses were being reviewed. Canada Superior Oil Co. Ltd. won Petroleum Prospecting License (PPL) 25, covering 60 blocks both onshore and offshore in the Gulf Province, to drill two wells with an option for drilling a third one.

Another concession was PPL 19, covering 110 blocks onshore and offshore at Madang and East Sepik, which will be worked jointly by Coastal Papua New Guinea Exploration Inc., Memmont New Guinea Oil Co., and St. Joe Petroleum Corp. The third concession was PPL 27, covering 94 blocks onshore in the southern highlands in Western and West Sepik Provinces. It will be operated by Amoco Papua New Guinea Exploration Co.

Australia's Broken Hill became involved in the search for oil through its subsidiary, Hematite Petroleum Pty. Ltd., which acquired a 25% interest in Australasian Petroleum Co. Pty. Ltd. (APC) and Island Exploration Co. Pty. Ltd. (IEC). Both APC and IEC are committed to drill three exploration wells at a cost of $17 million.

The Government's petroleum policy entitles it to receive 60% to 80% of future revenues from oil and gas production. The revenues will be derived from 1.25% royalty on wellhead values, a 50% tax on income, a tax on profits over an agreed upon rate of return, and a Government equity of up to 22.5%.

Table 6.—Papua New Guinea: Exports of copper, by destination

(Metric tons of copper content)

Destination	1980	1981
China	5,884	2,961
Germany, Federal Republic of	47,302	56,150
Japan	77,178	85,019
Korea, Republic of	--	2,741
Spain	11,877	18,474
Unspecified	--	2,720
Total	142,241	168,065

SOLOMON ISLANDS

Mineral output of the Solomon Islands consisted mainly of small quantities of alluvial gold and silver valued at $700,000.[5] Lime was recovered from marine shells, but the production quantity was not reported.

Substantial progress was made in geological mapping of the country. The data suggest a great diversity in the country's mineral resources. However, the quantity and quality of minerals was too low to interest mining companies at present metal prices.

Prospecting by companies in recent years was concentrated on bauxite. Mitsui Mining and Smelting Co. prospected on Rennell Island and Pacific Aluminium Ltd. prospected on Vaghena Island. Bauxite reserves in the western part of Rennell were estimated at 25 million tons with an alumina content of 48%, and those on Vaghena, at 30 million tons with an alumina content of 47%.

Other minerals prospected were nickel and copper. Nickel laterite was known to occur on the Islands of Santa Isabel, San Jorge, and southern Choiseul. Copper ore occurred in several parts of Guadalcanal, Florida, New Georgia, and Santa Isabel Islands. Other minerals found were gold, chromite, manganese, phosphate rock, and limestone.

The Government was actively seeking foreign investors for several mining projects. Investment may be made independently or jointly with local private firms or the Government.

TONGA

Tonga's mineral output consisted essentially of sand and gravel, coral, and other building material obtained from the beach and inland coral quarries. Production of coral and sand was 150,000 tons and 25,000 tons, respectively.

The Ministry of Land, Survey, and Natural Resources imposed stringent licensing and supervisory controls on sand mining. The escalation of sand mining to meet an increasing demand for locally manufactured concrete and concrete blocks caused severe coastal erosion.

Samuel Gary Oil Producers Inc. commenced offshore drilling between the Islands of Tongatapu and Eua. Data interpretation revealed promising prospects for hydrocarbons, but no significant quantities were encountered.

VANUATU

Vanuatu's only mine remained closed in 1982. The manganese mine located at Forari, 55 kilometers northwest of Port Vita on Vate (Efate) Island, is owned by Southland Mining Ltd. of Australia (87.5%) and public shareholders (12.5%) and was operated by Le Manganese de Vate. Some 120,000 tons of reserves remain in the Forari Mine; production is expected to resume in the future. The company employed some 100 native Vanuatuans and shipped 40% to 42% metallurgical-grade manganese, primarily to Japan.

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[1]Physical scientist, Division of Foreign Data.

[2]Where necessary, values have been converted from Fijian dollars (£) to U.S. dollars at the rate of £1=US$1.04.

[3]Where necessary, values have been converted from Communaute Financiere Pacifique francs (CFPF) to U.S. dollars at the rate of CFPF98.48=US$1.00.

[4]Where necessary, values have been converted from Papua New Guinean dollars (K$) to U.S. dollars at the rate of K$1=US$1.46.

[5]Where necessary, values have been converted from Solomon Island dollars (S$) to U.S. dollars at the rate of S$1=US$1.15.